# Human Papilloma Virus Awareness, Knowledge and Vaccine Acceptance among Norwegian Adolescents

Tina Stafne


Master thesis
Department of Health Management and Health Economics
The Faculty of Medicine

UNIVERSITY OF OSLO

May 15th 2014

2014

Human Papilloma Virus Awareness, Knowledge and Vaccine Acceptance among Norwegian Adolescents

Tina Stafne

http://www.duo.uio.no/

Publishing: Reprosentralen, University of Oslo

# Abstract

**Background:** Human papilloma virus (HPV) is a virus that causes genital warts and a range of different cancer types. Vaccination against HPV was introduced in Norway in 2009, for girls in the 7th grade, as a part of the Norwegian Childhood Vaccination Program. There has been much discussion about the HPV-vaccine before and after the vaccine introduction. The uptake of HPV-vaccination is lower (67-75%) than for other vaccines. The lower vaccine uptake may be explained by lack of information about HPV-related diseases, lack of information about the vaccine, fear of it or other factors. The aim of this thesis was to describe the girls' and the boys' knowledge of HPV and the HPV-vaccine and investigate if this knowledge influenced the willingness to get vaccinated.

**Method:** In the fall of 2012, two surveys were conducted among girls and boys aged 15-26 years. A total of 301 girls and 249 boys completed the questionnaires which included questions about awareness of HPV and the HPV-vaccine, participation in vaccination, knowledge of HPV and HPV-related disease, and willingness to get vaccinated. Boys were asked through a web-based survey, while the girls were interviewed by phone.

**Results:** Only 43% of girls and 30% of boys had heard of HPV. Even fewer had heard of the HPV-vaccine (21% of girls, 26% of boys). Despite the poor knowledge level, there was a high willingness to get vaccinated among the female (84%) and male (73%) respondents. The results from the regression showed that girls had more knowledge than boys of HPV (OR=1.815) and that it could lead to various types of cancers (OR=0.403). There was little association between knowledge and willingness to get vaccinated. However, among the boys there was a significant relationship between knowing that HPV can cause cancer and the willingness to receive HPV-vaccination.

**Conclusion:** Knowledge of HPV, HPV-related disease and of HPV-vaccination was limited among girls and boys aged 15-26. There is however much willingness to get vaccinated, which may indicate high trust in the Norwegian Health Authorities to provide safe vaccines. Given the suboptimal vaccine uptake and low level of knowledge we recommend the use of other methods of communication than the current, to use GPs and lowering of costs to increase access to the HPV-vaccine.

# Acknowledgements

The process of writing a master thesis has been a long and sometimes frustrating journey- but most of all it has been a valuable learning process. I would like to thank the persons who helped me along during this process - who have helped me or inspired me in different ways to either continue with or complete my thesis.

First of all I would like to express much appreciation to my supervisor, Professor Ivar S. Kristiansen, who has spent countless hours beyond the given supervising hours giving valuable advice and suggestions to my thesis. Had it not been for you, I would not have gotten in touch with Sanofi Pasteur who provided me with my data. On that note, I would also like to express much gratefulness to Sanofi Pasteur – the manufacturer of the Gardasil vaccine- for lending me their data. I would like to express my thanks as well to Gry Soløy at Ipsos MMI for her patience with my countless enquires about the data.

I am also grateful for the advice on my statistics analyses given by Professor Tron Anders Moger - your insights assured me that I was on the right track. Many thanks go to University lecturer Ivan Spehar as well, who gave me valuable recommendations about relevant literature regarding health behavioral models.

At last but not least, I want to express my appreciation for the support of my wonderful friends and family who have been patient with me during my year of thesis writing. Your support, insights and comments made it easier to keep going. A special thanks to my dearest Helge, for your understanding and support during the long hours of writing and the constant talking about my thesis when I was not writing. Many thanks go to my friend and fellow student, Christina Edwards, for always being encouraging and contributing with your experiences from your own master thesis process. I would especially like to thank everyone who helped me proofread this thesis; Anna Oppland Stenersen, Anne Andrada, Christina Edwards, Kristin Stafne and Helge Skivenes.

# Disclaimer

Sanofi Pasteur provided the data, but has not been involved in the analyses, reporting and interpretation of the findings. The analyses and interpretation of the findings are the responsibility of the author and do not necessarily express the opinion of Sanofi Pasteur.

# Table of Contents

# 1 Introduction

## 1.1 The Human Papilloma Virus (HPV)

Human Papilloma Virus (HPV) is a sexually transmittable infection that approximately 70% of us will be infected by during our lifetime. It can cause several types of cancer such as anal and penile cancer, cancer in the head and neck area as well as cervical cancer; the latter being most frequently occurring HPV-related cancer.

There are 100 different genotypes of HPV, but only a few of them characterized as "high risk" genotypes that are known to cause cancer. The high risk HPV-genotypes are genotype 16 and 18 which is detected most frequently among Norwegian women with cervical cancer (Norwegian Institute of Public Health, 2010). Cervical cancer is the third most common type of cancer among women aged 30-45 years old. The yearly incidence of cervical cancer in Norway is 250-300, and 75-100 of these women die from this disease every year. Additionally 3000 Norwegian women undergo surgery each year due to severe cervical precancerous states (Norwegian Institute of Public Health, 2010). HPV-infection can also lead to genital warts and it is estimated that 10.6% of the Norwegian population between 15 and 46 year old have been infected with genital warts (Norwegian Institute of Public Health, 2010). Smoking, use of birth control, HIV-infection and many child births are shown to be co-factors of HPV-related cancer development.

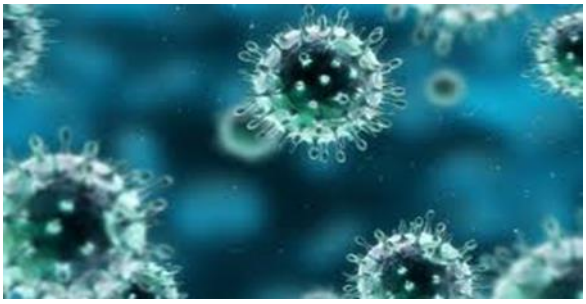


***Illustration of the Human Papilloma Virus.***

***Source:*** *http://womenshealthency.com*

There are two types of prevention against the HPV-cancers which are relevant here: primary; being the vaccine, secondary; being the screening program and the treatment options. The HPV-vaccine, the primary prevention[1], is the focus of this thesis.

## 1.2 Primary Prevention: The Vaccine

The primary prevention of cervical cancer, attributable to human papilloma virus types 16 and 18, by prophylactic vaccines, are recommended in many countries worldwide (OECD 2011: 118). There are two HPV-vaccines on the Norwegian market – the quadrivalent vaccine Gardasil® (Sanof Pasteur MSD) and the bivalent vaccine Cervarix® (GSK)- which protects against HPV-genotypes 16 and 18 that are responsible for 70% of cervical cancers. The Gardasil vaccine also provides protection against two more genotypes of HPV, which are type 6 and 11 (The Public Institute of Health, 2010). Condoms do not protect adequately against HPV-infection, as the virus can be present in skin areas that are not covered (Norwegian Institute of Public Health, 2010). The current Norwegian HPV-vaccination rate is registered to be; 70% of the girls born in 1997 have received one dose and 67% have received all three dozes necessary for full protection. This number is somewhat higher for the girls born in 1998 and 2000; 79% is registered having had the first doze and 75% of these girls have had all three doses. There were 71% of the girls born in 2000 that had gotten the first vaccination doze, and had in 2013 yet not received all dozes because the vaccination program is still ongoing for these girls (Norwegian Institute of Public Health, 2013).

A high vaccination rate is necessary to obtain elimination of a disease locally. While eradication on a global level may be an ideal goal for an immunization program; to this date smallpox is the only disease that has been eradicated (WHO, 2008). Still it is possible to eliminate a disease locally without global eradication of the causative microorganism. WHO (2008) states that if local eradication of a disease is to be achieved, one needs more than 95% population immunity through a two-dose vaccination regimen.

[1] Oncogenic HPV-vaccination is a type of primary prevention. It is crucial to understand how health prevention differs from health promotion. Health prevention is actions directed towards **preventing** illness, while health promotion is the **process of enabling** people to increase control over their own health (National Research 2009; WHO 2014).

It is important to stress that screening is still needed when one has taken the vaccine, as the vaccine only provides protection against 90% of the cellular changes caused by the HPV-genotypes 16 and 70% of the cellular changes caused by genotype 18 (Norwegian Institute of Public Health 2010; 7).

## 1.3 **Secondary Prevention: The Screening program and Treatment**

There has been an increasing public support of the national screening program for cervical cancer which is managed by The Cancer Registry of Norway (2011). The women who are invited to screening of HPV are between the ages of 25-69 years, and they are recommended to have a pap smear taken every three years. There are low grade and high grade cellular changes; the latter is followed up by a colposcopy (a gynecological examination). 3200 women get the confirmation that they have high gradient cellular changes and are treated by conisation, a process that involves removing a cone shaped part of the uterine tab. In 90% of the cases, this will remove the cellular changes. Approximately 60% of the 25-69 year old women follow the recommendation to take a pap smear every 3rd year (The Cancer Registry of Norway, 2013).

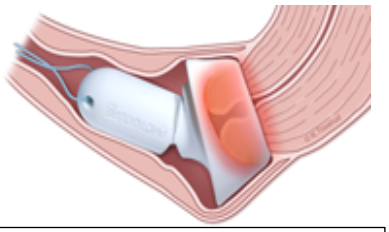
Cervical dysplasia (a precancerous condition) is mainly treated by local surgical procedures including loop electrosurgical excision procedure (LEEP), loop excision of transformation zone (LETZ), laser or cold knife in addition to cryosurgery (Arbyn et al., 2008).

There are several adverse effects in the treatment of cervical intraepithelial neoplasia; cold knife conisation, and probably both laser conisation and radical diathermy are associated with an increased risk of subsequent perinatal mortality and other serious pregnancy outcomes, compared to using laser ablation and cryotherapy (Arbyn et al., 2008).

There also exists a new and experimental cure for oncogenic HPV and precancerous lesions provided by the Norwegian pharmaceutical company Photocure. They are developing an intravaginal drug-device combination with an integrated light source. Photocure's treatment, Cevira, is administered locally to the cervix by the gynecologist, using the Cevira drug delivery device. The device includes an integrated light source that automatically starts and stops photo-activation of the drug. Cevira is an alternative to more invasive treatment

methods of precancerous lesions as it preserves the cervical tissue (Photocure, 2013). See illustration below.

Drug application to the Cevira device



Cervira-device applied to the Cervix (Source: Photocure 2013)

## 1.4 HPV- Controversies in Norway

In March 2008, the Council for Quality and Prioritization in Health Care Services recommended to implement the HPV-vaccine in the Norwegian Childhood Vaccination Program. There was disagreement among some of the council members on the question of implementation of the vaccine, some were skeptical about the vaccine and some were positive. The Institute of Public Health, the Directorate of Health and the Knowledge Center have stated that they were positive towards the vaccine prior to its introduction (Andreassen 2009:1). Despite the different opinions of the HPV-vaccine it was found by research to be safe and effective, and the vaccine could finally be introduced in 2009 as a part of the Childhood Vaccination Program. The vaccines were distributed by school nurses to girls in the 7$^{th}$ grade, and information was provided prior to the vaccination so that an informed consent could be given from parents and children according to the Norwegian law of consent (See the Patients Rights Act § 4-1).

The subject of vaccinating young women against a sexually transmittable infection (STI) has also incited some controversy in the media prior to the introduction of the childhood vaccination program in Norway of 2009. This controversy is still frequently portrayed in the media, and may shape how the HPV-vaccine is perceived by the public.

Research shows that media coverage can influence attitudes towards HPV and thereby influence HPV-vaccine acceptance (Casciotti 2011). The criticism towards the HPV-vaccine

in Norway was mainly about the effectiveness and safety concern, and was originated from health professionals, the media and the public.

One of the main opponents of introducing the HPV-vaccine was the editor of the Journal of the Norwegian Medical Association, Doctor Charlotte Haug. She has written several articles criticizing the safety and effect of the vaccine. According to Haug (2008) there are good reasons to be cautious upon introducing a large-scale vaccination program when there are so many essential questions still unanswered. She has expressed five points of critique: (1) will the vaccine prevent not only cervical lesions, but also cervical cancer and death? (2) Duration of the vaccine protection. (3) How the vaccine affects the natural immunity of the vaccinated. (4) How the vaccine generally affects (i.e. adverse effects) preadolescent girls, given that the only trial in this cohort have been on the immune response. The studies with clinical endpoints CIN 2/3 involved 16-24 year old women. (5)The vaccination program effect on screening practices: Whether women that are vaccinated may be less likely than unvaccinated women to pursue screening.

One thing Haug (2008) is right about, is that we cannot know the duration of the protection or how it affects natural immunity, but this is the case for all new vaccines and it can take several years of studies to properly assess the duration of the protection. Despite of this, the vaccine has been found to be effective and safe according to the Future 2 Study Group (2007). Although the follow-up duration of the individuals in the Future 2 Study Group was for only 4-5 years, the Future 2 Study Group found no evidence of waning immunity or decreased efficacy for prevention of infection or persistent shedding of virus. Additionally, according to the yearly HPV-vaccine report from the Norwegian Institute of Public Health (2013), 94% of the registered adverse effects on the preadolescent girls were non-serious such as nausea, dizziness etc. Regarding point five on Haug's list of criticism, the international literature does suggest that women think that they do not need screening if they are vaccinated. This issue is addressed in the information booklets given prior to HPV-vaccination of girls in Norway.

Furthermore, a few newspaper articles will be presented for the purpose of reflecting some general criticism and support of the HPV-vaccine in the media. The newspaper articles were found by conducting a search in the newspaper database www.retriever- info.com, where the most relevant articles were selected.

In a survey that "Respons analyse" conducted for the national newspaper Aftenposten (2013), 25% of respondents answered that they did not trust government's advice about vaccination. Division director Hanne Nøkleby's, at the Institute of Public Health, comment to this survey was that there was a "vaccine-fatigue" and that the mass-vaccination against the swine flu may have been perceived as exaggerated by a lot of people. She also emphasized that the vaccines in the childhood vaccination program have good vaccine coverage. Nøkleby further commented that

> *...the HPV-vaccine has had a rough start with the resistance and the competition with the pandemic vaccination. Even though the vaccination coverage is not as high as for the other childhood vaccines, it seems to have found its place as a childhood vaccine with about 80% coverage for the first dose and 70-80%[2] for three doses (Aftenposten 2013).*

There are also positive reactions to the HPV-vaccination program in Norway. The leader of the GynoCancer association expressed that they wanted the HPV-vaccine as soon as possible:

> *By offering this vaccine against HPV-related cancer to girls, one can prevent approximately 100 deaths per year. What are we waiting for?" (Hardanger Folkeblad 2013)*.

The newspapers Aftenposten (2012) and Fædrelandsvennen (2012) wrote that the vaccines are proven to be safe and that there are few adverse effects from the vaccination. Doctor Sveinung Sørbye at the University Hospital of Northern Norway said, in an interview to Fædrelandsvennen, that we should be better at vaccinating in Norway and that the vaccine was found to be safe;

> …the major professional bodies in this country are unanimous in their verdict after a few years of use, the vaccine is effective, and it provides few and not very serious side effects."(Fædrelandsvennen 2012).

Thus, it seems important to provide the most accurate information to the public in order to increase vaccine compliance. If this information has been conveyed in an adequately informative manner, this is assumed to be reflected in the knowledge of the adolescent Norwegian girls and boys in our data. A literature search reveals that there are no recent studies in Norway that map knowledge of HPV-vaccination among Norwegian girls or boys.

[2] These statistics are not entirely correct, see chapter 1.2 for the exact statistics of vaccine coverage.

Division director Hanne Nøkleby at the Public Institute of Health said that they were revising the possibility of providing the vaccine to boys as of June 2013, but a cost-benefit analysis of expanding the vaccine coverage to both sexes was not yet ready (Bergensavisen 2013). However, most recently a study reviewing the cost-effectiveness of extending the HPV-vaccination to pre-adolescent boys has been published, which will be discussed later on in chapter 7.5.

*The main purpose of this study is thus to map and describe the girls' and the boys' HPV-virus and HPV-vaccine knowledge level and investigate whether their knowledge influences the willingness to receive the HPV-vaccine*. We will in addition to the data analysis - conduct a review of the international literature review on attitudes to explore other factors than knowledge, which may influence the decision to get vaccinated.

# 2 Theoretical Framework

## 2.1 Knowledge Theory: What is Knowledge?

The controversies over HPV-vaccination underscore that the concept of knowledge is not an easy one. Knowledge can be understood in many different ways, depending on what point of view is taken. Knowledge can be subjective, private or something shared with others, thus public (Eriksson-Backa, 2003, p. 84). The Oxford dictionary (2013) defines knowledge as

> …facts, information, and skills acquired through experience" or "education" or as "awareness or familiarity gained by experience of a fact or situation.

On the other hand, pragmatic epistemology[3], thinks of knowledge as a collection of theories which are fulfilling some purpose for a living organism (Hjørland, 2000). In constructionism[4], knowledge is believed to be something that people do together; that it is a dialogue between individuals (Tuominen & Savolainen, 1997). Tengström (1987) restricts the utilization of the term knowledge by claiming it can only exist within a human being, not in dead objects as books or computers.

A common way to view knowledge within social psychology, is through the perspective of social cognition which studies how a person obtains, uses, remembers, mediates and develops (here: health) knowledge. Within social cognition knowledge is defined in a broad sense as knowing, according to Hautamäki referred to in Eriksson-Backa (2003, p. 41). The basic assumption within this theory is that the perception of a person, rather than objective matters of the environment, directs the person's social behavior. Concepts such as knowledge, attributions attitudes and beliefs acquired in the socialization process, are central to the cognitive approach to behavior (Aalto, 1999, p. 28). The individual's knowledge of a health

[3] Epistemology is a perspective within discursive psychology that "…holds a belief that there is a knowable domain of facts about human experience and consciousness that can be discovered through the application of reason and rationality…" (Augostinos, Walker and Donaghue 2006; 49).

[4] The (social) constructionist movement was among the first "schools" of psychology, and regards knowledge as socially constructed via negotiated socio-cultural meanings (Augostinos, Walker and Donaghue 2006; 49).

issue can thus come from socializing with others or be acquired through experience, and it can direct health behavior such as getting vaccinated. Understanding cognition therefore helps to predict a person's (here: health) behavioral tendencies and motivation predicts whether the specific behavior will occur (Fiske & Taylor, 1984).

## 2.2 Health Behavioral Theory

There are various research materials to be found providing theories on the link between obtained health knowledge and the preventative action. Allen (1997, read in Eriksson Backa, 28) thought that when an individual had obtained adequate knowledge, possibly by information seeking, the behavior might be selected to maximize the probability of obtaining the best possible consequence of the action which has been chosen.

On the other hand, other researchers believed that knowledge alone is not guaranteed to change health behavior (Rakowski et al., 1990). Rimal (2000) found that self-efficacy, which is the belief in your ability to make changes in behavior, was an essential factor for changing dietary knowledge into action by eating according to health recommendations. He also accentuated that barriers play an important role. As long as an individual perceived the barriers towards a healthy lifestyle as too high, high knowledge would not lead to improved health behavior (Rimal, 2000). Knowing what the barriers are and whether the barriers are high, is thus important to investigate when aiming to say something about the reasons why people do not want to get vaccinated.

There is also thought to be a difference between the genders when it comes to seeking information about health. Rakowski et al. (1990) found that women are better than men in seeking information. Other researchers - like Jayanti and Burns (1998)- have found that health motivation and health consciousness are shown to influence preventive health care behaviors. Although knowledge is found to have an influence on the health behavior of the individual, these latter researchers found that health behavior is primarily influenced by the *value* that consumers *perceive* in engaging in such actions.

The understanding of the determinants of individuals' health-related behaviors can be explained by the use of a health behavioral model, the models commonly used to describe

health behavior are the theory of reasoned action (TRA), theory of planned behavior (TPB), the stage models and the health belief model.

The Health Belief Model (HBM) is particularly suited when selling to understand why individuals choose or do not choose to participate in health prevention programs such as vaccination. The HBM contains several primary concepts that predict why people will take action to prevent, screen for, or to control illness conditions. Glanz, Rimer, and Viswanath (2008) description of the HBM model will be used to account for its central concepts (figure 1.1):

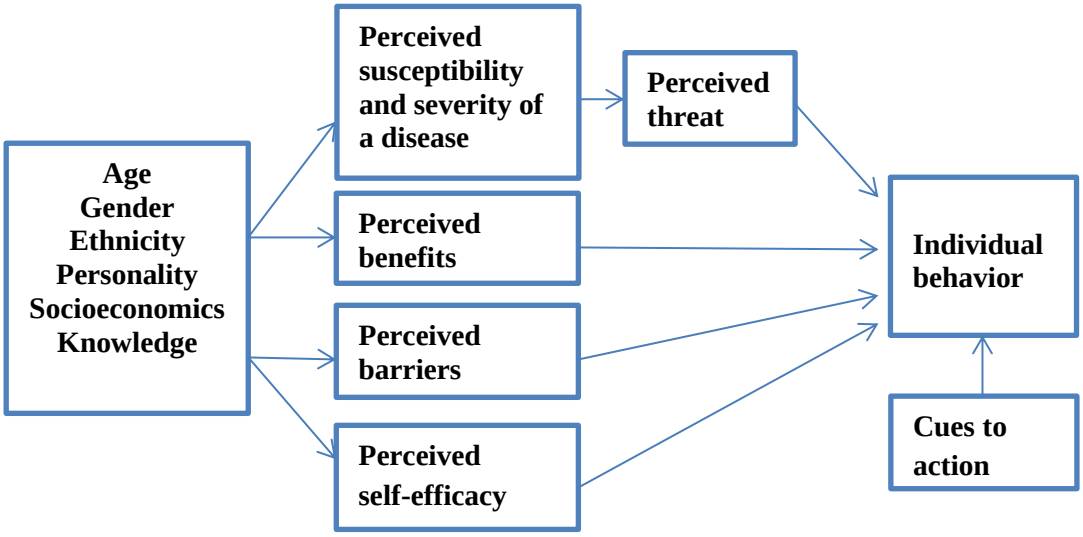



Figure 1.1. Health Belief Model Components and Linkages (Glanz et al., 2008, p. 49).

Peoples' health behaviors are thus thought to be influenced by their susceptibility to a disease, the perceived severity of a disease, the perceived benefits of an action, the perceived self-efficacy and barriers towards the health prevention in question.

**Perceived susceptibility (1)** refers to beliefs about the likelihood of getting a disease or condition. **Perceived severity (2)**; feelings about the seriousness of contracting an illness or leaving it untreated is composed by evaluations of both medical/clinical consequences and possible social consequences. **Perceived benefits (3)**, even if a person perceives personal susceptibility, whether this perception leads to behavior change is determined by the beliefs of personal benefits. The potential negative aspects of health actions- **perceived barriers (4)** - may act as obstacles to undertake the recommended behavior. An unconscious analysis occurs where the individual weighs the actions benefits up against the perceived barriers.

According to Hochbaum (1958, read in Glanz et al 2008) readiness to take action could only be enhanced by other factors, particularly **cues to action (5)**, which could be anything from bodily events to environmental event such as media publicity. **(6) Self-efficacy** is explained as "the conviction that one can successfully execute the behavior required to produce the outcomes" (Bandura 1997, read in Glanz et al 2008). These factors are then again believed to be influenced by the characteristics of the individual such as their age, gender, ethnicity, personality, socioeconomic status and their knowledge.

# 3 Literature Review

## 3.1 Research on Knowledge and Attitudes of HPV and the HPV-vaccine

In order to know what has been done within this field of research I conducted a search in PUBMED, CINAHL and PSYCINFO (also called OvidSP). The search words used were HPV, HPV-vaccine, knowledge, attitudes. The last two terms were searched upon by using "and/or" to find articles on both issues. The first search in PUBMED resulted in 687 articles. In order to portray the most recent literature, we focused on articles mainly after 2007. To narrow down the search result even more, we chose to mainly focus on articles from Europe and North-America because these countries are quite similar to Norway. The search in CINAHL and PSYCINFO was conducted likewise and resulted in 184 and 167 articles; a saturation point was starting to emerge. Google scholar was also used to find articles concerning the Norwegian HPV-research.

## 3.2 Knowledge

According to an American survey, conducted among 363 women in obstetrics and gynecology clinics in Milwaukee, the knowledge of the HPV-virus was not very high. 43 % of these women had not heard of HPV and only 27% of these knew that it causes cervical cancer (Benning & Lund, 2007). In England, there was an equally lack in the knowledge base. A study conducted among vaccinated girls (n=1033) in English schools established that only half of those asked knew that the HPV-vaccine protected against cervical cancer, that condoms could reduce the risk of an HPV-infection and that screening was needed regardless of vaccine status (Bowyer, Marlow, Hibbitts, Pollock, & Waller, 2013). This lack of information about the HPV and HPV-vaccine could also be seen in other European countries as Germany, as found in two German studies (Blodt, Holmberg, Muller-Nordhorn, & Rieckmann, 2012; Samkange-Zeeb, Spallek, Klug, & Zeeb, 2012). Blodt and co-workers (2012) found that a high percentage of the women (n=259) and men (n=245) aged 18-25 in this study were aware that there existed a vaccine that protects against cervical cancer (respectively 95 and 80%). Half of these women knew what HPV was, and even fewer of the men knew what HPV was (25.3%). In addition, many of the women and men (51 and 42%

respectively) from this survey thought that only women could be infected by HPV. Additionally, the conclusion from this study was that, despite the fact that uptake was satisfactorily high in many European countries, their respondents showed low knowledge of HPV. Therefore, the researchers were of the opinion that the knowledge should be improved (Blodt et al., 2012).

Another issue concerning knowledge was the misconception that you did not need to undergo screening if you had taken the HPV-vaccine. The English NHS introduced the HPV-vaccination program for girls aged 12-13 years old, one year prior to the implementation in Norway. A study was conducted in the UK three years after the vaccine-introduction among parents of these girls, which revealed that these parents did not know that screening would be needed irrespective of vaccination status. The misconception about not needing screening was present when the parents and girls formed their decision on taking the vaccine. There was thus a need for further information stressing this particular issue (Henderson et al., 2011).

There were two of the articles from the literature-search that were closely linked to the Norwegian HPV situation, one article from Sweden and one from Denmark. Surprising findings from the Swedish research shows that Swedish adolescents (n=608) were positive about taking the vaccine (84% of respondents) despite the fact that they had poor knowledge of the HPV-vaccine: only 13.5% knew what HPV was. Although they had positive attitudes towards HPV-vaccination, 73% of the interviewed stated that they would like more information prior to the vaccination (Gottvall, Larsson, Hoglund, & Tyden, 2009). Research by Petersen et al. (2009) shows that knowledge was also limited among Danish 14-39 year old women (n=425), as 1.2% correctly stated HPV as the cause of cervical cancer. Furthermore, the majority of the respondents (96.2%) expressed a clear wish for their GP to actively inform their patients of such vaccination.

With regards to how the knowledge was obtained, Herzog, Huh, Downs, Smith, and Monk (2008) found that less than 25% of patients, mothers of patient were given information from their physician about HPV and/or cervical cancer vaccination and that most information seemed to come from non-scientific sources. Herzog (2008, p. 5) additionally, stated that "improving awareness of HPV-infection and/or vaccination against cervical cancer has been difficult to achieve despite several efforts conducted during recent years".

Similar studies in Norway that are of significance is a master thesis by Thomasli (2011) whose findings are based on international articles to attempt to describe possible vaccine barriers in Norway. He found that overall vaccine acceptance was good, while knowledge of HPV and HPV-related infections was poor. Although there is no evidence that an increase in knowledge leads to greater acceptance of the HPV-vaccine, it turns out that a number of counter-arguments against the vaccine were based on low knowledge. The study conducted by Oren and Skjeldestad (2006) investigated the knowledge of HPV among Norwegian women aged 16-24 years in 1998-2000. Because this study was conducted before the vaccine introduction - no questions were asked about the HPV- vaccine. Nevertheless, they found that only 20% of the women knew what HPV was and 15% answered correctly on which disease an HPV-infection can lead to. No studies were found regarding HPV knowledge of Norwegian men, which shows that there is a gap within this field of research.

## 3.3 **Attitudes**

General reasons reported by American parents for not vaccinating their teens were the following: "not recommended", "not necessary", "not sexually active" and "safety reasons/side effects" (Darden et al., 2013).

According to Ford, English, Davenport, and Stinnett (2009), the barriers that can influence adolescent vaccination are especially: (1)public concerns (such as insufficient knowledge, safety concerns, controversy and negative attitudes), (2)practitioner concerns, (3)delivery issues, (4)minor consent issues; (5)cost issues and (6) lack of coordination in timing of vaccine recommendations, (7)supply, and (8)financing. Herzog and colleagues (2008) also mention financial and insurance coverage as important barriers. The cost issue is only relevant in a Norwegian setting if there are women or men who are not included in the vaccination program who wants to get vaccinated.

Kahn et al. (2008) conducted a USA-based study where he found that 66% of the young female respondents intended to get vaccinated, despite only 5% of these actually being vaccinated. A UK study from Brabin, Roberts, Farzaneh, and Kitchener (2006) , also showed that there were parental concerns regarding the safety as 61 % of the parents reported serious concerns related to vaccine safety (n=317). Another US study presented the reasons why mothers (n=32) of girls that were vaccinated believed that it was important to get the vaccine.

The major reasons for wanting their daughters to take the HPV-vaccine reported was protecting their daughters, influence from health personnel, family and friends, along with media and marketing influence (Griffioen et al., 2012).

The interviewed Dutch mothers (2009 n=511, 2010 n=250) of vaccinated girls (2009; n=243, 210; n=225) had opinions that differed from opinions found in the Darden and co-workers (2013) study. These were that some had specific beliefs about the protective effect of the vaccine; they cared about the opinions of others and about others' vaccination participation. Major issues were also trust in the authorities and indifference towards the vaccine (van Keulen et al., 2012).

The studies from the US show that there were some concern in the population that the HPV-vaccine promotes sexual activity, a concern which was not supported by researchers who found that there was not a higher risk for sexually transmittable disease in a vaccinated cohort of 493 girls compared to an unvaccinated cohort of 905 girls (Bednarczyk, Davis, Ault, Orenstein, & Omer, 2012).

The study by Okoronkwo, Sieswerda, Cooper, Binette, and Todd (2012) investigated Canadian parents' attitudes, towards having their girls in the 9th grade vaccinated, by the use of pre-formulated statements which the parents choose to agree or disagree with. The statements they chose to agree with, that were not found in the studies from other countries, were that "financial gain for the pharmaceutical companies is driving the vaccine push" and that "the effectiveness was not good enough" (n=711). Another Canada-based study, conducted among 1350 respondents with female children, showed that most of these parents were positive towards the vaccine. More than 70% (73.8%; 95% confidence interval [CI] 71.5%– 76.1%) intended to have their daughters undergo vaccination against HPV, while it was not reported how many girls had actually been vaccinated. About 20% of the parents expressed concerns about the influence of the HPV-vaccine on sexual behavior (Ogilvie et al., 2007).

A Danish phone based study conducted in 2009 found that a large proportion of the women interviewed (n=794) were unwilling to get vaccinated against HPV, 242 of the women contacted refused to get vaccinated due to costs and lack of information about vaccination benefits (Mortensen, 2010). This author additionally conducted a literature review, in which a Danish Health Technology Assessment of HPV-vaccination showed that attitudes of parents

who had children eligible for vaccination, were mostly positive and that 70-90% wanted to have their children vaccinated.

## 3.4 HPV and Men: "A Girls Vaccine"

The literature search resulted in somewhat fewer articles regarding the knowledge and attitudes among men, and most of these articles were American. In the study by Katz, Kam, Krieger, and Roberto (2012) American men reported knowing what HPV was, but had poor further knowledge of HPV.

Another American study concluded that men were more likely to take the vaccine if it was framed as preventing cancer rather than promoting it as preventing genital warts (McRee, Reiter, Chantala, & Brewer, 2010). It is also stated in an article by Fontenot and Morelock (2012), which reviews three studies on men and the HPV-vaccine, that the public health efforts to educate on the matter have been mainly aimed at women. These researchers add that the health efforts should also be aimed at men because the vaccine could be beneficial for men too. The first study reviewed in this article found that men were more likely to take the vaccine if it did not cost anything, and that most of the men in the latter two studies reviewed, knew what HPV is and could connect HPV to cervical cancer. Nevertheless, they did not know that it could lead to cancer among men.

If we are to introduce vaccination of boys as well, what can be said to be the main problem is that the HPV-vaccine has been marketed as a "girl's vaccine". Gardasil has focused on a HPV-vaccine marketing strategy which promoted slogans saying that the girls were exercising their "decision autonomy" by getting the HPV-vaccine (Mishra & Graham, 2012). Despite of this lacking information about HPV-related cancer among men Liddon, Hood, Wynn, and Markowitz (2010) concluded -reviewing literature on HPV-vaccine acceptability among men in the US and other countries- that the acceptability was high among college men (74%-84%). In the general community the acceptability among men was found to be lower (33%), and the mothers of teenage boys acceptability varied from low to very high depending on ethnicity (12%-100%).

# 4 Research Questions and Hypotheses

Against the background of suboptimal vaccination uptake in Norway, this thesis will explore the determinants of knowledge about HPV related disease and vaccination, and the association between knowledge and willingness to get vaccinated. We will specifically address the following research questions:

1. What is the current level of knowledge of HPV and the HPV-vaccine among girls and boys aged 15-25 years in Norway?

2. What are the determinants of knowledge about the HPV and HPV-vaccine among girls and boys aged 15-25 years?

3. Is there a relationship between knowledge of HPV/the HPV-vaccine and age and gender?

4. Is there a relationship between knowledge of HPV/the HPV-vaccine and willingness to get vaccinated if it were free of charge?

Specifically, we will test the following hypotheses[5]:

Hypothesis 1: Girls have more knowledge than boys about HPV and the HPV-vaccine[6].

Hypothesis 2: Older girls have more knowledge than the younger ones about HPV and the HPV-vaccine.

Hypothesis 3: Older boys have more knowledge than the younger ones about HPV and the HPV-vaccine.

Hypothesis 4: There is a relationship between the girls' knowledge about HPV and the HPV-vaccine and willingness to accept vaccination if it were free of charge.

Hypothesis 5: There is a relationship between boys' knowledge about HPV and the HPV-vaccine and willingness to accept the vaccination if it were free of charge.

[5] These hypotheses are the alternative hypotheses which will be tested against five null hypotheses, further details about the null hypotheses are provided in the results (see chapter 7.3).

[6] Knowledge of HPV and the HPV-vaccine refers to questions 3, 4 and 5/6 in the questionnaire (Appendix 9.1 and 9.2).

# 5 Methods and Data

## 5.1 Questionnaires

In 2012 Ipsos MMI undertook two questionnaire surveys on behalf of Sanofi Pasteur, the manufacturer of the two HPV-vaccines on the market. We were provided with the questionnaire and the data set by Sanofi Pasteur in the fall of 2013. The aim of these surveys was to measure the level of knowledge and attitudes towards the Human Papilloma Virus and the vaccine among girls and boys 15-25 years.The survey of the girls was phone-based. The phone numbers that Ipsos MMI used were provided by Bisnode Matchit and included landlines and cellphone numbers. The phone survey was implemented by calling randomly selected numbers from this list. The Ipsos interviewers asked for an interview with a girl within the ages of 15-25. In total, 301 of the phone calls resulted in an interview with girls who agreed to participate in the survey. There were 519 girls who did not want to answer. No financial incentive was offered. The average interview duration was 5.30 minutes.

The female questionnaire included in total 15 items, three of which were background questions (appendix 9.1). All of the questions had predefined answer categories, except the question about willingness to pay. In addition, the interviewer registered nine other variables:

- Start time
- Interviewer number.
- Date
- SMS-id
- Week
- Municipality
- Landline/Cellphone
- End time
- Time use in total

The survey of the boys was web-based. Ipsos MMI recruited the males by sending e-mail invitations to an internet panel of boys within the ages of 15-26. The respondents were asked to answer the HPV-related questions and were directed to a web site upon their agreement to participate. They had unlimited time to respond to the web-survey, which implies that they could put the survey aside and complete it later if desired. The boys were given a financial incentive to respond to the survey. They were included in the draw of two gift cards worth

NOK 1000 each. In total, 249 males between the ages 15-26 completed the web-survey. Thirty-nine boys who opened the survey, did not complete it; providing a non-completion rate of 13.5%. Information on the total number of males who were invited was not available from Ipsos MMI. The interview duration was 6-9 min.

The male questionnaire had in total 23 items, of which 10 were background questions (appendix 9.2). Four of the main questions were open-ended, while the remaining questions were close-ended. Some of the questions were asked twice, first as open and then as closed questions with predefined categories. In addition, the interviewer registered 9 other variables:

- Start time
- Week number
- Weekday
- Web-id
- Project-id
- List basis- Ordinary base draw:
  Costumer list/Enlisted by phone/Enlisted from E-base
- End time
- End date
- Coment field

The questionnaires contained questions about their knowledge of condom protection against HPV, knowledge of the HPV-virus & related diseases, awareness and knowledge of the HPV-vaccine, vaccination status, willingness to pay (WTP) for the vaccine, willingness to get vaccinated if free of charge, where they would go to get vaccinated (Public health nurse, GP, Health center, Clinic), who they wanted to get HPV-vaccine information from and whether boys should get the same HPV-vaccine as girls. The girls' questionnaire also contained background questions about age, county and education. In addition to these three background questions, the male questionnaire included questions on income, centrality, number of persons in the household, marital status and number of children living in the household. Because this additional background information on boys, question f-j (Appendix 9.2), was not given in the female survey too, we decided not to use this additional background information in the analyses.

## 5.2 **Statistical Method**

The statistical analyses were performed in SPSS version 20. The male dataset came with a set of population weights, presumably because the dataset was not entirely representative of the Norwegian population of the same age and gender. Ipsos MMI could not explain the nature of these weights and they were not used in any analyses presented here. The primary descriptive statistical analysis was conducted by the means of frequency tables and cross tabulations.

As most of our variables were categorical, we used chi-squared tests to assess bivariate relationships between the independent variables (gender, age, willingness to get vaccinated) and outcome variables ("Have heard of HPV", "Knows that HPV causes cancer", "Knows that Vaccination can protect against HPV" and "Willingness to get vaccinated"). Tests were two-sided and statistical significance was set to $P<0.05$.

Logistic regression models were used to assess the association between the independent variables and the dependent variables. For the purpose of conducting these analyses, we merged the female and male datasets.

## 5.3 **Variables Chosen**

To test the five hypotheses, five variables that were similar for the female and male dataset were chosen. These variables were age, gender, Q3, Q4 and Q5/Q6. Some of the chosen variables did not have mutually exclusive response categories; therefore we recoded these into new variables so that we had one category for the answer we were interested in and another category for the remaining response categories. This applied to Q4 in the male and female questionnaires, where we were interested in the number of respondents that answered that an HPV-infection can lead to cervical cancer, cancer in general and genital cancer. We recoded Q3 so that we excluded the "don't know" category, leaving us with "yes/no" responses to the question "Have you heard of HPV?".

In addition, both the age variable and the educational attainment variable were recoded in SPSS using visual binning. Older girls were coded from 20-25 and the younger girls were coded from 15-19 years. The older boys were coded from age 21-26 and the younger boys as 15-20 years old. It must be noted that the question "How do you think you can protect yourselves against HPV-infection?" is asked twice in the *male questionnaire*, first unaided

(Q4, appendix 9.2) and then aided (Q5, appendix 9.2). To test their actual knowledge, the unaided question (Q4) was chosen for the analyses.

## 5.4 Literature Search

We reviewed academic literature concerning knowledge and attitudes towards HPV and the HPV-vaccine. In total, 24 of these studies were found relevant and were included in the literature review. Further details about the literature search are presented in chapter 3.

# 6 Results

## 6.1 Descriptive Result: The Female Sample

In total, 301 girls were interviewed.

**Table 1. The female sample according to age, educational attainment and place of living, compared to the general Norwegian population of the same age, sex and place of living.**

| | Sample (N=301) | Population |
|---|---|---|
| **Age (years)** | | |
| Mean | 21.3 | 19.9 |
| Median | 22.0 | 20.0 |
| Range | 10 | 10 |
| | | |
| **Educational attainment (%)** | | |
| Elementary +Junior high school | 10.6 | 49.9 |
| High school level | 52.2 | 33.0 |
| University level | 21.6 | 13.3 |
| In education/*no available data* | 15.6 | 3.8 |
| | | |
| **County (%)** | | |
| Østfold | 7.3 | 5.2 |
| Akershus | 9.6 | 10.5 |
| Oslo | 16.6 | 12.6 |
| Hedmark | 3.7 | 3.6 |
| Oppland | 3.0 | 3.6 |
| Buskerud | 6.3 | 4.9 |
| Vestfold | 3.3 | 4.6 |
| Telemark | 2.7 | 3.3 |
| Aust-Agder | 2.7 | 2.2 |
| Vest-Agder | 2.7 | 3.7 |
| Rogaland | 5.3 | 9.3 |
| Hordaland | 11.0 | 10.4 |
| Sogn og Fjordane | 2.0 | 2.2 |
| Møre og Romsdal | 3.3 | 5.1 |
| Sør-Trøndelag | 11 | 6.4 |
| Nord-Trøndelag | 2.0 | 2.8 |
| Nordland | 2.7 | 4.8 |
| Troms | 3.7 | 3.3 |
| Finnmark | 1.3 | 1.5 |
| *SSB data for the educational attainment of the female population 16-24 years old. | | |

The mean and median age was 21.3 and 22 years, respectively. The sample had about the same age and geographic distribution as the Norwegian population of the same age and sex, and included more girls with higher educational attainment (Table 1).

There were 64% who did not know of any diseases that condom do not protect adequately against, while less than 1% responded that condoms not protect well enough against HPV and Cervical cancer (Table 2).

**Table 2. Response to the questions "Do you know which sexually transmittable diseases condoms do not protect adequately against, in case which?"**

| | Frequency | Percent |
|---|---|---|
| Cervical cancer | 1 | 0.3 |
| HPV | 2 | 0.7 |
| Chlamydia | 42 | 14 |
| Other | 63 | 20.9 |
| No | 193 | 64.1 |
| **Total** | **301** | **100** |

In total, 43% of the girls reported having heard of the HPV-virus and less than 1% did not know if they had heard of it (Table 3).

**Table 3. Response to the question "Have you heard of HPV (the Human Papilloma Virus)?" ***

| | Frequency | Percent |
|---|---|---|
| Yes | 131 | 43.5 |
| No | 165 | 54.8 |
| Don't know | 2 | 0.7 |
| Missing | 3 | 1.0 |
| Total | **301** | **100.0** |

*298 valid responses among 301 respondents.

After being informed about the nature of HPV, about 26% of the girls knew that HPV could lead to cervical cancer, 17% knew that it could lead to cancer in general and 47% responded that they did not know.

**Table 4. Response to the question "HPV is a sexually transferable virus that can lead to abnormalities in the cervix. The HPV- virus can cause several types of disease. Which diseases do you think it can lead to?"**

| | Frequency | Percent |
|---|---|---|
| Cervical cancer | 80 | 26.6 |
| Cancer | 52 | 17.3 |
| Sexually transmittable diseases | 6 | 2.0 |
| Others | 49 | 16.3 |
| Don't know | 143 | 47.5 |
| Total number of responses | **330** | **NA** |

*The respondents could indicate more than one type of disease

The responses to the question on how they thought they could protect themselves against an HPV-infection were as follows: 45% mentioned condom, 21% vaccination, 27% did not know 12% others, while 5% mentioned contraceptives (Table 5).

**Table 5. Response to the question "How do you think you can protect yourselves against an HPV-infection?"***

| | Frequency | Percent |
|---|---|---|
| Condom | 136 | 45.2 |
| Contraceptives | 15 | 5.0 |
| Vaccination | 65 | 21.6 |
| Others | 35 | 11.6 |
| Don't know | 82 | 27.2 |
| Total | **333** | **NA** |

*Before this question was posed, it had been informed that HPV is a sexually transferable virus that can lead to abnormalities in the cervix. The respondents could indicate more than one method.

The proportion of girls who have heard of the HPV-vaccine was approximately 22%.

**Table 6. Response to the question "Did you know that there exists a vaccine against HPV?"***

| | Frequency | Percent* |
|---|---|---|
| Yes | 66 | 21.9 |
| No | 170 | 56.5 |
| Missing | 65 | 21.6 |
| Total | **301** | **100** |

* 236 responses among 301 respondents.

In total, 7% of the girls were vaccinated (Table 7). If they were vaccinated they were expected to know of the vaccine.

**Table 7. The response to the question "Are you vaccinated against HPV?"***

| | Frequency | Percent |
|---|---|---|
| Yes | 21 | 7.0 |
| No | 104 | 34.6 |
| Don't know | 4 | 1.3 |
| Missing | 172 | 57.1 |
| Total | **301** | **100** |

*129 responses among 301 respondents

However, only 129 out of 301 responded to the vaccine status question, indicating that the vaccine status of the sample is not representative for the population. Therefore we calculated the proportion of girls in the sample that, according to their age, should have been vaccinated. Mass vaccination of girls started in 2009, meaning the girls who were 15 and 16 years old had been offered vaccination. According to our calculations, the percentage of 15 and 16 year old girls that who should have been vaccinated in our sample were 30% (Table 8).

**Table 8. Vaccine-uptake among girls 15-16 years old**

| | HPV-vaccinated | | | |
|---|---|---|---|---|
| Age | N | Yes | No | Uncertain /missing |
| 15 | 7 | 4 (57.1%) | 3 | 0 |
| 16 | 13 | 2 (15.4%) | 2 | 9 |
| **Total** | 20 | 6 (30.0%) | 5 | 9 |

Approximately half of the respondents (46%) were not willing to pay above NOK2000 forthe HPV-vaccine, while 9% were willing to pay as much as NOK10 000. The proportion of respondents who did not want the vaccine if it was free of charge (15%) is the same proportion as those who did not want to pay for the vaccine*.

**Table 9. Response to the question "How much would you be willing to pay for a vaccine that protects against cancer and genital warts, choose a price between 500 - and 10.000, -?"**

| WTP(NOK) | Frequency | Percent |
|---|---|---|
| 500-999 | 58 | 19.2 |
| 1000-1499 | 76 | 25.2 |
| 1500-1999 | 7 | 2.3 |
| 2000-2499 | 44 | 14.6 |
| 2500-2999 | 2 | 0.7 |
| 3000-3499 | 12 | 4.0 |
| 3500-3999 | 1 | 0.3 |
| 4000-9999 | 27 | 9.0 |
| 10000 | 27 | 9.0 |
| Missing | 47 | 15.7 |
| Total | **301** | **100** |

*254 answers among 301 respondents: Those who did not want to pay or answer were listed as missing.

Out of the 301 girls, 84% wanted to get vaccinated if they received the HPV-vaccine free of charge and 8% of respondents did not want to get vaccinated.

**Table 10. Response to the question "If you received the vaccine free of charge, would you get yourself vaccinated?"**

| | Frequency | Percent |
|---|---|---|
| Yes | 254 | 84.4 |
| No | 25 | 8.3 |
| Don't know | 22 | 7.3 |
| Total | **301** | **100** |

Approximately half of the girls (47%) preferred to go to their GP to get vaccinated, 9% to a public health nurse and 9% to a health center (Table 11).

**Table 11. Response to the question "Where would you go to get yourself vaccinated?"**

| | Frequency | Percent |
|---|---|---|
| Public health nurse | 29 | 9.6 |
| General practitioner | 142 | 47.2 |
| Health center | 29 | 9.6 |
| Hospital | 9 | 3.0 |
| Vaccination office | 4 | 1.3 |
| Doctor/Medical center/medical practice | 13 | 4.3 |
| Clinic | 3 | 1.0 |
| Where the vaccine is offered | 7 | 2.3 |
| Other | 4 | 1.3 |
| Don't know | 14 | 4.7 |
| Missing | 47 | 15.7 |
| Total | **301** | **100** |

There were 42% of the girls who wanted information about HPV to be provided by the public health nurse, while 32% preferred it to be provided by their GP. Few respondents (1%) preferred their parents to convey this information.

**Table 12. Response to the question "Who would you like to provide you with information on HPV and how to protect yourself?"**

| | Frequency | Percent |
|---|---|---|
| Public health nurse | 127 | 42.2 |
| General practitioner | 97 | 32.2 |
| Parents | 3 | 1.0 |
| Internet | 10 | 3.3 |
| Other | 140 | 46.5 |
| Don't know | 26 | 8.6 |
| Total | **403** | **NA** |

*The respondents could indicate more than one information source

When being asked if the boys should get the same offer of the HPV-vaccine as girls, 94% of the girls responded “yes”, while 2% responded “no” and 3% did not know whether they should get the same offer.

**Table 13. Response to the question “The HPV-virus causes disease among boys and girls. Girls in the 7th grade are offered the vaccine free of charge-*should* boys get the same offer?”**

| | Frequency | Percent |
|---|---|---|
| Yes | 285 | 94.7 |
| No | 6 | 2.0 |
| Don't know | 10 | 3.3 |
| Total | **301** | **100** |

## 6.2 Descriptive Results: The Male Sample

In total, 249 males were interviewed. The mean and median age was 22 and 23 years, respectively. The sample had approximately the same age and geographic distribution as the Norwegian population of the same sex, while the sample had a larger proportion of boys with higher education (Table 14).

**Table 14. The male sample according to age, educational attainment and place of living, compared to the general Norwegian population of the same age, sex and location.**

| | Sample (N=249) | Population |
|---|---|---|
| **Age (years)** | | |
| Mean | 22 | 19.9 |
| Median | 23 | 20 |
| Range | 10 | 10 |
| | | |
| **Educational attainment (%)*** | | |
| Elementary + Junior high school | 10.4 | 57.3 |
| High school level | 30.1 | 32.7 |
| University level | 30.5 | 6.9 |
| In education/*no available data* | 28.9 | *3.9* |
| | | |
| **County (%)** | | |
| Østfold | 2.8 | 5.3 |
| Akershus | 11.2 | 10.7 |
| Oslo | 20.9 | 11.2 |
| Hedmark | 1.2 | 3.8 |
| Oppland | 3.2 | 3.6 |
| Buskerud | 1.2 | 5.0 |
| Vestfold | 4.0 | 4.6 |
| Telemark | 1.2 | 3.4 |
| Aust-Agder | 2.4 | 2.2 |
| Vest-Agder | 2.4 | 3.7 |
| Rogaland | 5.6 | 9.4 |
| Hordaland | 13.3 | 10.3 |
| Sogn og Fjordane | 1.6 | 2.3 |
| Møre og Romsdal | 2.8 | 5.2 |
| Sør-Trøndelag | 14.9 | 6.4 |
| Nord-Trøndelag | 1.2 | 2.7 |
| Nordland | 5.2 | 5.0 |
| Troms | 4.4 | 3.4 |
| Finnmark | 0.4 | 1.6 |
| *SSB data of the educational attainment of the male population 16-24 years | | |

Many of the boys did not know of any sexually transmittable diseases that condoms do not protect adequately against (35%), while 20% thought it did not protect adequately against herpes and less than 1% thought it did not protect adequately against HPV.

**Table 15. Response to the question "Do you know which sexually transmittable diseases condoms do not protect adequately against, in case which?"**

| | Frequency | Percent |
|---|---|---|
| HPV | 10 | 4.0 |
| Herpes | 47 | 18.9 |
| HIV/Aids | 36 | 14.4 |
| Chlamydia | 22 | 8.8 |
| Crabs/scabies | 19 | 7.6 |
| Genital warts | 18 | 7.2 |
| Gonorrhea | 11 | 4.4 |
| Syphilis | 5 | 2.0 |
| Thrush | 6 | 2.4 |
| Hepatitis | 3 | 1.2 |
| Other | 6 | 2.4 |
| None, condom protect against everything | 19 | 7.6 |
| Don't know/No answer | 112 | 35.0 |
| **Total** | **314** | **NA** |

Among male respondents 30% had heard of HPV (Table 16).

**Table 16. Response to the question "Have you heard of HPV, the Human Papilloma Virus?"**

| | Frequency | Percent |
|---|---|---|
| Yes | 76 | 30.5 |
| No | 166 | 66.7 |
| Don't know | 7 | 2.8 |
| Total | **249** | **100** |

When asked what the HPV-virus could lead to, 70% of the respondents answered "I don't know" or did not respond to this question. In total, 24% of the boys responded correctly that HPV could lead to various cancer types (cervical, genital and cancer in general).

**Table 17. Response to the question "The HPV virus can cause several types of diseases. Can you mention any of these diseases?"(Unaided)***

| | Frequency | Percent |
|---|---|---|
| Cervical cancer | 26 | 10.4 |
| Cancer | 33 | 13.3 |
| Genital warts | 13 | 5.2 |
| AIDS | 3 | 1.2 |
| Cancer in the genital area | 3 | 1.2 |
| Infertility | 2 | 0.8 |
| Others | 4 | 1.6 |
| Don't know/not answered | 175 | 70.7 |
| Total | **259** | **NA** |

*The respondents could indicate more than one type of disease

Upon questioned about how they thought they could protect themselves against HPV-infection, 28% believed that using a condom gave protection against an HPV-infection, 26% thought that vaccination gave protection against an infection and 24% did not know (Table 18).

**Table 18. Response to the question "How do you think you can protect yourselves against HPV-infection?"**

| | Frequency | Percent |
|---|---|---|
| Condom | 72 | 28.9 |
| Vaccination | 67 | 26.9 |
| Abstinence | 37 | 14.9 |
| Regular checkups | 11 | 4.4 |
| Good hygiene | 5 | 2.0 |
| Medical products | 6 | 2.4 |

| | | |
|---|---|---|
| Not having casual sex | 6 | 2.4 |
| Common sense/ Being careful | 4 | 1.6 |
| Contraception | 4 | 1.6 |
| Other | 3 | 1.2 |
| Don't know/No answer | 62 | 24.9 |
| Total | **277** | **NA** |

*Before this question was posed, the respondents had been informed that HPV is a sexually transmittable virus that can lead to cellular abnormalities. The respondents could indicate more than one method of protection.

In total, 26% of the boys responded that they knew that a vaccine against the HPV-virus existed (Table 19.

**Table 19. Response to the question "Did you know that there exists a vaccine against HPV?"**

| | **Frequency** | **Percent*** |
|---|---|---|
| Yes | 67 | 26.9 |
| No | 171 | 68.7 |
| Don't know | 11 | 4.4 |
| Total | **249** | **100** |

Not surprisingly, as the boys were not included in the childhood vaccination program for HPV, only a few of the boys that had received HPV-vaccination (below 1%).

**Table 20. Response to the question "Are you vaccinated against HPV?"**

| | **Frequency** | **Percent** |
|---|---|---|
| Yes | 2 | 0.8 |
| No | 180 | 72.3 |
| Don't know | 67 | 26.9 |
| Total | **249** | **100** |

Over half of the male respondents (58%) were not willing to pay more than NOK 2000 for a HPV-vaccine, while 8% were willing to pay NOK 10 000.

**Table 21. Response to the question "How much would you be willing to pay for a vaccine that protects against cancer and genital warts, choose a price between NOK. 500 - and 10.000, -?"***

| WTP(NOK) | Frequency | Percent |
|---|---|---|
| 500-999 | 90 | 36.1 |
| 1000-1499 | 42 | 16.9 |
| 1500-1999 | 12 | 4.8 |
| 2000-2499 | 21 | 8.4 |
| 2500-2999 | 7 | 2.8 |
| 3000-3499 | 6 | 2.4 |
| 3500-3999 | 1 | 0.4 |
| 4000-9999 | 13 | 5.2 |
| 10000 | 22 | 8.8 |
| Missing | 35 | 14.2 |
| Total | **249** | **100** |
| *Those who did not want to pay for a vaccine were listed as missing. | | |

73% of the boys wanted to receive HPV-vaccination if it were free of charge.

**Table 22. Response to the question "If you were offered the vaccine free of charge, would you get vaccinated?"**

| | Frequency | Percent |
|---|---|---|
| Yes | 184 | 73.9 |
| No | 18 | 7.2 |
| Don't know | 47 | 18.9 |
| Total | **249** | **100** |

Approximately half of the male respondents (53%) believed they could get vaccinated by their GP, while 13% thought they could go to the public health nurse to get vaccinated.

**Table 23. Response to the question "Where would you have gone to get vaccinated?"**

| | Frequency | Percent |
|---|---|---|
| Public health nurse | 33 | 13.3 |
| General practitioner | 132 | 53.0 |
| Health center | 2 | 0.8 |
| Clinic | 2 | 0.8 |
| Others | 3 | 1.2 |
| Don't know | 12 | 4.8 |
| Missing | 65 | 26.1 |
| Total | **249** | **100.0** |

The boys preferred the information on HPV and how to protect themselves to be conveyed mostly by their GP (68%) and their public health nurse (66%), while some also preferred to receive this information on the internet (54%). Very few (8%) wanted their parents to inform them about this subject.

**Table 24. Response to the question "Who would you like to provide you with information on HPV and how to protect yourself?"***

| | Frequency | Percent |
|---|---|---|
| Public health nurse | 165 | 66.3 |
| General practitioner | 171 | 68.7 |
| Parents | 20 | 8.0 |
| Internet | 135 | 54.2 |
| Others | 38 | 15.3 |
| Don't know | 21 | 8.4 |
| Total | **550** | **NA** |

*The respondents could indicate multiple responses

80% of the boys believed that the boys should, as the girls, be offered the HPV-vaccine free of charge, while 2% responded no to this question and 16% responded that they did not know if the boys should get the same offer (table 25).

**Table 25. Response to the question "The HPV-virus leads to disease among boys and girls. Girls in the 7th grade are offered the vaccine free of charge-*should* boys get the same offer?"**

| | Frequency | Percent |
|---|---|---|
| Yes | 201 | 80.7 |
| No | 7 | 2.8 |
| Don't know | 41 | 16.5 |
| Total | **249** | **100** |

## 6.3 Testing of the Hypotheses

The information level about HPV-related disease and protection varied between the girls and boys (Table 26). Girls had more awareness of HPV and what it causes (Q3 and Q4/Q5), while

a slightly higher proportion of the boys compared to the girls knew that the vaccine protects against an HPV-infection (Q5/Q6).

**Table 26. Hypothesis 1-5: Knowledge variables in the statistical analyses**

| | Girls(301) | Boys(249) | |
|---|---|---|---|
| | Yes | Yes | Total |
| Q3: Awareness about HPV | 131 (43.3%) | 76 (30.5%) | 207 |
| Q4: Causes cancer | 52 (61.1%) | 33 (38.8%) | 85 |
| Q5/Q6: Protection with vaccine | 65 (21.6%) | 72 (26.9%) | 137 |

***Testing of Hypothesis 1:*** *$H_0$: The girls and boys have the same level of knowledge of HPV and the HPV-vaccine.*

*$H_1$: Girls have more knowledge than boys about HPV and the HPV-vaccine.*

**Table 27. Chi-square analysis of differences in knowledge between the girls and boys men. The table states the expected counts for scoring yes/cancer/vaccine.**

| Question | Girls | Boys | P-value |
|---|---|---|---|
| **$Q_3$: Have heard of HPV** | **131(113)** | **76(93)** | **0.002** |
| **Total** | **296** | **242** | |
| **$Q_4$: Knows that HPV can lead to cervical cancer, genital cancer and cancer** | **127(102)** | **59(84)** | **0.000** |
| **Total** | **301** | **248** | |
| **$Q_5$/$Q_6$: How do you think you can protect yourself against HPV? (vaccine)** | **65(73)** | **67(60)** | **0.139** |
| **Total** | **301** | **248** | |

The differences between the genders knowledge (Table 26) are statistically significant except for the question about protection (Table 27). In other words, hypothesis one was confirmed for Q3 and Q4, except for question Q5/Q6.

**Table 28. Chi-square analysis of differences in knowledge between older girls/boys and younger girls/boys. The table states the expected counts for the scores yes/cervical cancer, cancer, genital cancer/vaccine.**

| Question | Younger girls(15-19) | Older girls(20-25) | p-value |
|---|---|---|---|
| $Q_3$: Have heard of HPV | 27(29) | 104(101) | 0.534 |
| Total | 66 | 230 | |
| $Q_4$: Knows that HPV can lead to cancer and cervical cancer | 27(29) | 100(99) | 0.637 |
| Total | 68 | 233 | |
| Q5: How do you think you can protect yourself against HPV? (vaccine) | 19(14) | 46(50) | 0.148 |
| Total | 68 | 233 | |
| **Questions** | **Younger boys(15-20)** | **Older boys (21-26)** | **p-value** |
| Q3: Have heard of HPV | 16(20) | 60(55) | 0.198 |
| Total | 64 | 178 | |
| Q4: Knows that HPV can lead to cancer, genital cancer and cervical cancer | 16(16) | 43(43) | 0.967 |
| Total | 67 | 182 | |
| Q6: How do you think you can protect yourself against HPV? (vaccine) | 14(18) | 53(49) | 0.194 |
| Total | 67 | 182 | |

***Testing of hypothesis2 and 3:*** *$H_0$: There is no difference in knowledge of HPV and the HPV-vaccine between the older and younger girls/boys.*

*$H_1$: Older girls/boys have more knowledge than the younger ones.*

The differences between younger and older girls knowledge were statistically non-significant, thus we could retain the null hypothesis (table 28). Likewise, we could retain the null hypothesis of hypothesis 3, that there were no differences in the level of knowledge between the older and younger boys, with p-values larger than 0.05 (table 28).

**Table 29. Chi-square testing of the relationship between the girls/boys knowledge and "willingness to get vaccinated". The table states the expected counts for the scores yes/cervical cancer, cancer, genital cancer/vaccine.**

| Question | Willing to get vaccinated(girls) | Not willing to get vaccinated(girls) | p-value |
|---|---|---|---|
| **$Q_3$: Have heard of HPV** | **108(111)** | **13(11)** | **0.598** |
| **Total** | **251** | **25** | |
| **$Q_4$:Knows that HPV can lead to cancer and cervical cancer** | **102(107)** | **11(10)** | **0.100** |
| **Total** | **254** | **25** | |
| **Q5: How do you think you can protect yourself against HPV? (vaccine)** | **59(55)** | **4(6)** | **0.235** |
| **Total** | **254** | **25** | |
| **Questions** | **Willing to get vaccinated(boys)** | **Not willing to get vaccinated(boys)** | **p-value** |
| **Q3: Have heard of HPV** | **57(56)** | **8(7)** | **0.266** |
| **Total** | **178** | **18** | |
| **Q4:Knows that HPV can lead to cancer, genital cancer and cervical cancer** | **44(43)** | **8(4)** | **0.043** |
| **Total** | **184** | **18** | |
| **Q6: How do you think you can protect yourself against HPV? (vaccine)** | **49(49)** | **8(5)** | **0.167** |
| **Total** | **184** | **18** | |

*Hypothesis testing of hypothesis4 and 5:*

*$H_0$: There is no relationship between girls/boys' having knowledge of HPV and the HPV-vaccine and willingness to get vaccinated.*

*$H_1$: There is a relationship between girls/boys' knowledge and willingness to get vaccinated.*

The relationship between knowledge and willingness to get vaccinated was statistically non-significant and we retained the null hypothesis of hypothesis 4. Thus the null hypothesis stating "that there is no relationship between willingness to get vaccinated and the girls' knowledge" was retained.

Looking at table 29 we can see that there is one statistically significant result from the testing of hypothesis five confirming that there was a relationship between the boys' willingness to get vaccinated and knowledge of what disease HPV causes. Thus we accepted the alternative hypothesis that there is a relationship between boys' knowledge that HPV can lead to cancer, genital cancer, plus cancer in general and their willingness to get vaccinated if the vaccine is free of charge. We retained the null hypothesis for question 3 and 6, as these results were statistically non-significant.

## 6.4 Logistic Regression

Testing through logistic regressions further supported the hypothesis that there was a significant effect of gender with regards to having heard of HPV. The odds ratio for gender indicates that the girls were more likely to have heard of HPV. We can see from table 30 that respondents answering "No" increased by 81% (=1.815*100-100) when the respondents were male. The effect of age on having heard of HPV was non-significant.

**Table 30. Logistic regression of the response to "Have you heard of HPV?" (Yes=0, no=1)**

| Variable | OR | 95% CI | p |
|---|---|---|---|
| **Constant** | 3.634 | NA | 0.063 |
| **Gender (female=0, male=1)** | 1.815 | 1.265-2.606 | 0.001 |
| **Age (years)** | 0.952 | 0.894-1.013 | 0.12 |
| **2loglikelihood,cox&snell,Nagelkerke R:** | 702.103, 0.022, 0.030 | | |

There was a significant effect of gender on knowing that HPV can cause various cancer types. The girls were more likely than boys to know that HPV causes cancer; the probability for answering that HPV causes cancer decreased by 59.7% if the respondent was male (table 31).

**Table 31. Logistic regression of respondents that knows that HPV causes cancer (Causes cancer, cervical cancer, genital cancer=1, none of the three=0)**

| Variable | OR | 95% CI | p |
|---|---|---|---|
| **Constant** | 0.231 | NA | 0.042 |
| **Gender (female=0, male=1)** | 0.403 | 0.276-0.588 | 0.000 |
| **Age (years)** | 1.055 | 0.989-1.126 | 0.105 |
| **2loglikelihood,cox&snell,Nagelkerke R:** | 676.474, 0.043, 0.060 | | |

There were no significant effects of neither gender nor age on knowing that getting vaccinated protects against an HPV-infection (table 32).

**Table 32. Logistic regression of those who knows that vaccination protects against HPV (Vaccination=1, all other answers=0)**

| Variable | OR | 95% CI | p |
|---|---|---|---|
| **Constant** | 0.137 | NA | 0.009 |
| **Gender (female=0, male=1)** | 1.321 | 0.889-1.963 | 0.168 |
| **Age (years)** | 1.033 | 0.965-1.107 | 0.350 |
| **2loglikelihood,cox&snell,Nagelkerke R:** | 601.941, 0.006, 0.009 | | |

Both gender and age are statistically significant as variables that predict the probability of willingness to get vaccinated. For an additional unit of increase in age the odds of not being willing to get vaccinated increases with 13.3%. If the respondents were male the odds for not being willing to get vaccinated increased by 72.9% (table 31). Hence, the girls were more willing than boys to get vaccinated.

**Table 33. Logistic regression of willingness to get vaccinated (Yes=0, No+Dont know=1)**

| Variable | OR | 95% CI | p |
|---|---|---|---|
| **Constant** | 0.012 | NA | 0.000 |
| **Gender (female=0, male=1)** | 1.729 | 1.125-2.658 | 0.012 |
| **Age (years)** | 1.133 | 1.047-1.226 | 0.002 |
| **2loglikelihood,cox&snell,Nagelkerke R:** | 532.952, 0.035, 0.055 | | |

## 6.5 Summary of Literature Review

Several of the research articles that were reviewed indicate that knowledge of HPV was limited in various countries in Europe and the US. Some studies reported that despite poor knowledge of the HPV-virus, the vaccine acceptance was high (Gottvall et al. 2009; Kahn et al 2008). The observed lack of knowledge made researchers conclude that there was a need for more information on the HPV-virus and methods to protect against the virus in order to improve vaccine uptakes in countries where the vaccine uptake is not optimal (Blodt er al 2012; Henderson et al 2011; Petersen et al. 2009; Herzog et al 2008). Henderson and co-workers (2011) also found that there was a need to address the misconception that screening was needed irrespective of vaccine-status.

The most frequent barriers found towards vaccination were: (1) insufficient knowledge, (2) safety concerns, (3) controversy, (4) doubts about the protective effects, (5) opinions of others, and (6) others participation. Additional barriers not mentioned as often were: people who did not feel a need for vaccination, they did not get vaccinated because they were not sexually active, practitioners concerns, that the financial gain was driving the vaccine push, delivery issues, minor consent issues and concerns about the effectiveness.

According to Mortensen (2010), intention to get vaccinated was low due to cost and lack of information of the benefits. In contrast, three other studies showed that the intention to get vaccinated was high, even though few of the total respondents were actually inoculated or statistics of vaccine uptake was not provided (Ogilvie et al 2007; Khan et al 2008).

We found no previous research evidence of HPV-related knowledge or attitudes towards vaccination in Norway. The latest study on women concerning HPV knowledge did not include questions about the HPV-vaccine knowledge as it was conducted before the introduction of the HPV-vaccine in Norway (Øren & Skjeldestad 2006). However, two of the Scandinavian studies might give us an insight of what the attitudes could look like in Norway. Mortensen (2009) and Gottvall and co-workers (2009) found that most of the parents and the adolescents (70% and 84% respectively) were positive towards HPV-vaccination.

# 7 Discussion

Less than half of the girls and boys had heard about HPV, and even fewer knew that there existed a vaccine against HPV: 22% and 27% of boys and girls, respectively. Despite limited knowledge about the HPV-virus and HPV-vaccine, most of the female (84%) and male (74%) respondents were willing to get vaccinated if it were free of charge. These findings of a limited level of HPV-knowledge and a high willingness to receive vaccination are in accordance with findings in a Swedish study. One of the hypotheses was that there is a relationship between willingness to get vaccinated and being knowledgeable of HPV and the vaccine, but the regression analyses indicated that there was only an association between the boys' knowledge and willingness to get vaccinated.

## 7.1 Limitations

There are limitations to these data and the analysis as with all studies, and these need to be addressed to establish the quality of this study. Unfortunately, the questionnaires were both very brief with few questions and with few open response possibilities. To our knowledge, the survey questionnaires were not based on focus groups or pilot testing. Hence, the two major weaknesses of this study was the briefness of the questionnaires and the small sample sizes.

### 7.1.1 Selection Bias

Selection bias is error in any process during the gathering of data (Litwin, 1995). There are four kinds of selection bias, which are compliance bias, sampling bias, unit non-response bias, item non-response bias- two of them are relevant for this study.

### 7.1.2 Sampling Bias

Sampling bias occurs when the data are gathered in such a way that the samples may not reflect the entire population. The girls in the phone-based study were not drawn from the national phone registry, but from a commercial company that provided landlines and mobile phone numbers. It is not uncommon that different network providers target different costumer groups. The specific phone company may consequently unintentionally oversample persons with specific characteristics.

Information was missing regarding how many boys were invited to participate in the web-based survey. A response-rate could thus not be calculated. The boys were drawn from a web-panel and this recruiting method may exclude some participants that for instance were reluctant to opening emails, had limited internet access or had issues with opening the questionnaire web-page.

There may also be bias related to those who participated in the study. It is likely, with regards to both surveys, that the ones who chose to answer were the ones with no time pressure. This could lead to a relatively larger sample of one particular group, for example people on sick leave or students. In both samples persons with higher education were over-represented. It may be the case that those who were most interested in health related issues had higher education, and were more likely to participate in the surveys. In conclusion, it is likely that our results are subject to selection bias.

### 7.1.3 Item Non-response Bias

Item non-response bias is present when an individual is willing to participate in the interview, but refuses to answer some of the questions (Mitchell and Carson 1989). In the phone-based survey for girls, four out of twelve questions were not answered by all respondents. These four questions were the questions concerning: awareness of HPV, awareness of the HPV-vaccine, vaccination status, and where they would prefer to get vaccinated. The non-response rates associated with different questions varied (see table 34).

**Table 34. Item non-response for the female and male survey**

| | Item nonresponse % girls (n=301) | Item nonresponse % boys (n=249) |
|---|---|---|
| **Q3: heard of HPV** | 1% | - |
| **Q6: Heard of HPV-vaccine** | 21.6% | - |
| **Q7: Vaccination status** | 57.1% | - |
| **Q10/Q11: Where they would have gone to get vaccinated** | 15.7% | 26.1% |

Presumably, this does not pose a considerable threat to the validity of the results. There were as few as three answers missing for the question regarding awareness of HPV. The questions about having heard of the vaccine and the question of where they would go to get vaccinated

were not used in the hypothesis testing or regression analyses, so this did not pose a big problem either. The question regarding vaccine status showed a higher and more alarming item non-response rate at 57%. We thus attempted to calculate the percentage of girls that should have been vaccinated in our sample, because the 15-16 years old in 2012 should have been offered the vaccine through the Childhood Vaccination Program (see table 8 in chapter 7.2.1). This analysis showed that only 30% (6 out of 20) of the girls aged 15-16 years in our sample were vaccinated. The results of the web-based survey for boys showed that there was only one out of the total questions that contained missing results. This was the questions concerning where they would go to get vaccinated.

### 7.1.1 Other Limitations

An issue that could affect the validity of the results is that the surveys were conducted at different points in time, using different methods (phone based and web based surveys).

A possible limitation of the questionnaire method used is that respondents may have a tendency to answer "yes" to questions despite being unsure or not knowing. According to Sudman and Bradburn (1982, p. 113) respondents may for instance answer "yes" if they feel that they "should" know the answer to the question, and they do not want to reveal that they are not up to date on current events or knowledge ("yeah-saying"). This problem is particularly relevant for the yes/no questions.

## 7.2 Validity

Validity is the degree to which an item or scale measures what it sets out to measure (Litwin, 1995). The results are only as good as the measures we have used to investigate our research questions. There are four different types of validity which will be assessed here: content validity, criterion validity, construct validity and external validity.

*Content validity* refers to whether or not the questionnaire contains everything it should, does not contain anything it should not and if the questions are formulated in a manner which allows the respondent to provide answers we are interested in (Litwin 1995; Mitchell and Carson 1989). The formulation of the questions is important as it may influence the answers that are provided by the respondents.

The question about if boys should be given the same HPV-vaccine offer as girls (see q12 for females and q13 for males, appendix 9.1 and 9.2) was formulated in a leading manner as it asked if boys *should* be provided with the same offer. Respondents may have a tendency to answer in a way that they think will please the interviewer and asking this question using the wording "should" may give the respondents the impression that the interviewer thinks the desired answer is yes (Sudman & Bradburn, 1982). If the question had been asked in a less leading manner the respondents might have answered differently. Also it could be difficult to answer such a question if they did not possess full information about issues concerning HPV and the vaccine because many have not completed their education.

There were some questions that were not included in the survey that could have provided us with more comprehensive information about the attitudes towards HPV in our sample. Examples of such questions are: where the respondents had read or heard about the HPV-vaccine, whether they were positive towards the HPV-vaccine or not, if they knew that screening was still needed if one is vaccinated and what reason they had for not wanting to get vaccinated.

*Criterion validity* refers to how well one instrument stacks up to another instrument or predictor (Litwin, 1995). In this study, criterion validity refers to the comparison of using a web-based method versus using a phone-based method. The questionnaire for boys was conducted via a web-survey and they had limitless time to complete the survey. The problem with web-based surveys, compared to phone-based surveys, is that it is possible for the respondents to use the internet or other sources to acquire correct answers. In which case, it would not be a measure of their knowledge, but rather their skills in looking up answers. The boys spent 6-9 minutes to complete the survey. This may be an indication that they did not look up answers, as the amount of time to do so would have been limited given the time they spent on the survey.

*Construct validity* is concerned with how relevant a survey instrument is and whether responses provided are in agreement with known theoretical concepts (Litwin, 1995). Thus, it refers to how the questionnaire-instrument compares to other questionnaires used in similar research. The questions from our questionnaires are similar to many of the questionnaire questions in the articles found in the literature review, suggesting that it included relevant questions. For example the other research articles included questions on awareness of HPV, knowledge of the HPV-vaccine and knowledge of HPV-related diseases. The questionnaire

questions are also asked in accordance with leading theories on how to formulate good questionnaires (Sudman & Bradburn, 1982). Most of the questions are asked as opinion questions which is non-threatening by asking "have you heard of" or "how do you think" instead of asking them as knowledge questions (Sudman & Bradburn, 1982, p. 95).

### 7.2.1 External Validity

External validity refers to whether the results can be applied to other settings, in other words that the results are generalizable. The generalizability of the study will be considered by assessing the extent to which our sample characteristics corresponds to those of the Norwegian population registered by the official statistics. In the results chapter (see table 1 and table 13) we compared our sample age, educational attainment and county distribution with the age, educational attainment, and county distribution of the corresponding Norwegian population registered in SSB (Statistics Norway).

The educational attainment level registered by SSB is limited to statistics on 16-24 year olds, entailing that we do not know the true population educational attainment for 15-25 years olds corresponding to our sample. Also, the male and female sample of respondents both included more respondents with higher education compared to the population. This might compromise the generalizability. Regarding the sample mean and median age of both males and females, they had about the same mean and median age as the Norwegian population of the same age groups. There were only slight differences in the sample county distribution compared to the population's county distribution, and the county distribution can therefore be regarded as representative for the population of girls and boys aged 15-25.

## 7.3 Reliability

Reliability can be defined as the consistency of measurements, or of an individual's performance, on a test; or 'the absence of measurement error (Atkinson & Nevill, 1998).

One way to measure the consistency of measures is to compare the results of one of the questions that were asked twice in the male questionnaire (Table 35). This applies to Q4 and Q5 which both asks the respondents about which diseases they think HPV can lead to (appendix 9.2).

**Table 35. Comparison of q4 (unaided) and q5 (aided): "The HPV virus can cause several types of diseases. Can you mention any of these diseases?"***

| | Q4 percentages | Q5 percentages |
|---|---|---|
| **Cervical cancer** | 10% | 43% |
| **Cancer** | 13% | - |
| **Penile cancer** | - | 27% |
| **Genital warts** | 5% | 17% |
| **AIDS** | 1% | 6% |
| **Cancer in mouth and throat** | - | 22% |
| **Cancer in the genital area** | 1% | - |
| **Colon cancer** | - | 20% |
| **Herpes** | - | 7% |
| **Cancer of the vagina** | - | 30% |
| **Lymph cancer** | - | 18% |
| **Infertility** | 0.8% | - |
| **Other** | 1% | - |
| **Don't know/not answered** | 70% | 41% |

*There are more answer possibilities for question 5 than for question 4.

Q4 was first asked as an open question and Q5 was the same question asked in a close-ended manner providing the respondents with predetermined answer categories. When comparing the responses to these two questions, we are provided with higher percentages for the aided question Q5. This comparison indicates that the survey instrument may not have been very reliable given the differing percentages. This is, however, true only for this particular question.

## 7.4 Discussion of Findings

### 7.4.1 Knowledge Level

43% of the girls had heard of HPV, while fewer of the boys (30%) had heard of it. 43% of the girls and 23% of the boys knew that HPV could cause cervical cancer or cancer in general, which indicates that majority of the girls and boys answering yes to having heard of HPV

actually knew what HPV was. Although about half of the girls and boys knew of HPV, fewer of the girls and boys also knew that there existed a vaccine against HPV, 21% and 26% respectively. These findings of a limited knowledge level was not unexpected, as the literature shows that the knowledge of HPV and HPV-related issues were scarce in other countries in Europe and the US. What is interesting is that the primary results showed that a slightly higher percentage of the boys had heard of the vaccine compared to the girls. Despite this initially observed difference between girls' and boys' awareness of the HPV-vaccine, it is not necessarily the case that more boys than girls have heard of the vaccine. The observed higher percentage of boys that knew of the vaccine can be due to the fact that 65 of the female respondents did not respond to this question, while there were no missing responses registered in the male data for this question (see table 5 and 17). Also, according to the results form question 1, both boys and girls had poor knowledge of that condoms do not protect against an HPV infection. Less than 1% of the girls and boys responded that condoms do not protect well enough against HPV.

### 7.4.2 Differences in the Girls' and Boys' Knowledge.

The testing of hypotheses 1-4 suggested that there was a difference between the girls' and boys' knowledge about HPV, what it causes and how one can protect oneself against HPV. The results from the regression analyses further confirmed that the girls had more knowledge of HPV (OR=1.815; p=0.001) than the boys. We also found that girls were more likely than boys to know that the HPV-virus could lead to various types of cancer (OR=0.403; p=0.000). It was not surprising that the girls had more overall knowledge about HPV and what it causes than the boys. This corresponds with the findings of Rakowski (1990) that women (here: girls) were better at seeking information about their own health compared to men (here: boys). Additionally, the girls' having more knowledge is assumed to be an effect of the extensive focus on the vaccine as a girls vaccine, in line with Mishra & Graham (2012) findings and due to the vaccine, at present, being offered to girls only through the childhood vaccination program. Furthermore, the testing of hypothesis 2 and 3 showed no differences in knowledge between the younger and older girls/boys.

The regression analyses showed a non-significant result when investigating the relationship between gender and knowing that one can protect oneself against HPV by vaccination. This result is surprising, as one would perhaps expect the girls to know more than boys about the

HPV-vaccine being the main prevention against HPV since they are offered the vaccine through the childhood vaccination program. The lack of knowledge about the HPV-vaccine can, however, be explained by the low percentage of girls that reported being vaccinated in our sample. If they responded "no" to being vaccinated, it might be that they were less likely to have knowledge of the HPV-vaccine. Another explanation might be that many of the girls did not know enough about the advantages of vaccine protection compared to using a condom - as 45% of the girls answered that they thought condom protects against HPV and less than 1% of girls and boys listed HPV as the disease condoms do not protect adequately against. It is true that condoms provide good protection against many of the other sexually transmittable disease, but it does not protect entirely against HPV because HPV can be found on skin areas that are not protected by the condom. Those who have been vaccinated have been provided with the HPV-vaccine information booklet (The Norwegian Institute of Public Health 2012) which informed them that condoms do not provide adequate protection against HPV. Nevertheless, we do not know if the girls have read the booklet or if they recall the information.

### 7.4.3 Willingness to Get Vaccinated.

What was particularly interesting was that most of the girls (84%) and boys (73%) were willing to get vaccinated. This was true, even among those who did not possess high knowledge about the HPV-virus and the HPV-vaccine. Our finding coincides with the findings of Gottvall et al. (2009) who found that there was a high willingness to get vaccinated among Swedish adolescents despite having limited knowledge of HPV and the vaccine. This overall high willingness to get vaccinated might be explained by a high level of trust in the Norwegian Health Authorities. A survey presented in the national newspaper Aftenposten (2013) demonstrated that there were only 25% who did not trust the government's recommendations about vaccination, which implies that as many as 75% trust the health authorities to provide vaccination programs that are safe and effective.

Furthermore, the testing of hypothesis 4 and 5 provided us with few significant results. The only significant results found was from testing hypothesis 5 which demonstrated that the boys' willingness to get vaccinated was associated with knowledge that HPV can lead to various cancers. The boys were thus more likely to be willing to get vaccinated when they knew the risk that HPV posed to their health. According to the health belief model (Glanz et

al., 2008), an individual is more likely to take action with regards to one's health if one perceives the susceptibility to a disease to outweigh the barriers. Thus when the boys know that HPV can cause cancer, it may outweigh barriers such as possible adverse effects and costs.

From the regression analysis we found that the girls were more likely to be willing to get vaccinated compared to the boys (OR=1.729).This finding is curious, as the hypothesis testing of the relationship between girls knowledge level and their willingness to get vaccinated was non-significant (see table 27). Why more girls than boys were willing to get vaccinated might, again, be due to the fact that the HPV-vaccine is primarily known as a girl's vaccine. We also found that willingness to get vaccinated decreases with age (OR=1.133). A possible explanation for this is that it was less likely that they wanted to get vaccinated when they were older because the HPV-vaccine is not offered free of charge to girls older than 12. It may also be that the some of the girls knew that the vaccine only provides protection if you are *not yet* infected with HPV. The risk of having been infected with HPV increases for every year after 12 years of age, because of the increased likelihood that the girls will engage in sexual relations.

### 7.4.4 Vaccination Uptake in the Sample

According to our calculations only 30% of the 16-17 year old girls (see table 7) in our sample, that should have been part of the childhood vaccination program, were vaccinated. This is a much lower vaccination rate than that of the corresponding population of girls, where the vaccination rate ranged from 67%-79% for the girls born in 1997, 1998 and 2000. The reason for this low vaccination rate in our sample can only be speculated upon. There is a possibility that some of the girls did not recall having taken the vaccine, and thus falsely answering no to having taken the vaccine. It might also be that our sample did not include a representative sample of the age groups 15-17 that were vaccinated through the childhood vaccination program.

### 7.4.5 Reasons for Not Getting Vaccinated

Even though the willingness to get vaccinated was high overall, there were still 8% of the girls and 7% of the boys who answered "no" to if they were willing to get vaccinated even if it were provided free of charge. In addition, few of the respondents had been vaccinated.

Hence, there seems to be a gap between willingness to get vaccinated and actually being vaccinated. Therefore we want to address the possible reasons why some individuals did not want to get vaccinated, as this could provide insight to why the vaccination rates are suboptimal.

Rakowski (1990) pointed out it is not given that, once individuals are provided with knowledge, they will change behavior. So even if girls are provided with information leaflets prior to their HPV-vaccination there is no guarantee that their willingness to get vaccinated will increase.

The health belief model (see figure 1.1) from our theory chapter provides us with other factors than knowledge that can serve as explanatory factors for the gap between intention to get vaccinated and the true vaccination rates. These factors are; perceived susceptibility to and severity of disease, perceived benefits, perceived barriers, perceived self-efficacy and cues to action.

Among the abovementioned factors we have chosen to focus in particular on the barriers we found in the literature towards HPV-vaccination. In our literature review we found that the main barriers were (1) knowledge, (2) safety concerns, (3) controversy, (4) doubts about the protective effects, (5) opinions of others, (6) others participation. The less common barriers were fear that it promotes sexually activity, not sexually active, practitioners concerns, that the financial gain was driving the vaccine push, delivery issues, minor consent issues and concerns about the effectiveness. The cost barrier is especially relevant for those who are not provided the HPV-vaccine free of charge through the vaccination program.

The theory suggests that individuals may be more likely to adhere to a health action if they think that the threat of disease, in this case HPV-related cancer, might affect their life (Rutter & Quine, 2002). Therefore the findings of Darden and colleagues (2013) that some individuals does not believe their children can get infected by HPV as they are not sexually active, may lead to not think that it is not necessary for them to receive the HPV-vaccine. Additionally, individuals are more likely to adhere to a prevention program as HPV-vaccination if they perceive these barriers as less important compared to the benefits of vaccination. For example, we see that the boys who know that the vaccine can protect against cancer are more willing to get vaccinated. From this example we see that if knowledge as a barrier is addressed it may increase the vaccination uptake. However, it is important to be

aware that the other barriers such as what other peoples opinion about HPV-vaccination, costs and fear of it not being safe can equally influence the decision of whether to get vaccinated or not. In the HBM there is another factor which is relevant, which is cues or triggers to appropriate action. Rosenstock, read in (Rutter & Quine, 2002), believed that cues or triggers to action which can be having experienced an accident, or in this case having experienced knowing someone with cancer or recent media attention to the issue of HPV-vaccination may affect the vaccination behavior.

### 7.4.6 HPV-vaccination of Boys

The primary results also demonstrated that a high percentage of both boys (80%) and girls (94%) thought that the HPV-vaccination program should be extended to boys. As discussed previously in chapter 8.4, we cannot ascertain the validity of the answers as the question was asked in a leading manner. Nevertheless, if this is the true opinion of the male and female population aged 15-25 years old, they have expressed a wish for the vaccine to be offered to boys. Whether this opinion should be taken into account is up to the Norwegian Health Authorities to decide upon. This is not only a question of public opinion, but also a question of the cost-effectiveness of providing the vaccine to boys.

## 7.5 Policy Implications

The poor level of knowledge about HPV and HPV-vaccine indicate that the information efforts of the Norwegian Institute of Public Health (2010) prior to implementation of the vaccination policy was not very successful in increasing the girls' knowledge. Therefore, we suggest alternative methods of communicating information on the HPV and HPV-vaccine. One potential vehicle of achieving more knowledge of HPV is to include teaching about HPV and methods of protection against HPV in the 7th grade sex education syllabus, in order to increase the girls and boys knowledge of it prior to HPV-vaccination. It is also possible to use the public health nurses at schools, Health Centers for Sex Education or the GP to convey HPV-related information, as many of our respondents preferred their GP or public health nurse to convey such information.

Another possibility is to create a small scale health campaign which emphasizes the benefits of the HPV-vaccine and the risk when choosing not to get vaccinated. There is already much

useful information about the HPV-vaccine on the Norwegian Institute of Public Health's webpages. Unfortunately, most people seem to not know of this web site, and therefore a health campaign can inform about it. If the funding is an issue, social media, such as Facebook, may represent an effective and less expensive means to spread information about HPV-vaccination. It may be more effective in reaching our target groups, which are young girls or boys (if they are to be vaccinated too) likely to be active users of Facebook. Since knowledge alone is found to not be adequate in increasing vaccination, one needs to address the barriers in such a campaign. This could include ensuring of the safety and the effectiveness of the vaccine.

Another barrier that needs to be addressed is the access to the vaccine of those not in the vaccination program; if the HPV-vaccine is provided at the local GP office it is easy to access for most people. One can also decrease the cost barrier for the girls over 12 years and the boys by extending the HPV-vaccination to these groups. If society offers the vaccine free of charge to girls that are between the ages 13-25, we can increase the coverage and hopefully prevent more cases of HPV-related disease among girls (and boys). If the health authorities are not willing to offer the vaccine completely free of charge, another possibility to lower the cost barrier, is for the manufacturer to lower the cost of the vaccine so that the girls and boys not included in the vaccination program can afford it. NOK 3500-4000 for all three doses can be very expensive for young people, and they are perhaps less likely to take it if they have to choose between vaccination and buying other necessary goods. Yet another possibility is for the health authorities to subsidise HPV-vaccination of girls above the age of 12 and for boys, with for example half of the given prize.

It is possible to even extend the vaccine coverage to pre-adolescent boys. If they are inoculated at a young age, it is less likely that they will be infected by HPV and hence less likely to infect other girls or boys with the virus. If the HPV-vaccination program should be extended to others than $7^{th}$ grader girls, is an issue of the costs and benefits. There are two new cost-effectiveness studies by the Norwegian Knowledge Centre (2014) and Burger and colleagues (2014) which are relevant. The Norwegian Knowledge Centre (2014) have found that catch-up vaccination of girls below the age of 26 is cost-effective, while Burger and colleagues (2014) concluded that at the anticipated tender price ($75 per dose) expanding the HPV-vaccination program to boys may be cost-effective. Burger and colleagues (2014) also

concluded that their findings may warrant a change in the current female-only vaccination policy in Norway.

## 7.6 Conclusion

In conclusion, the awareness and knowledge of HPV, HPV-related diseases and the HPV-vaccine is limited among Norwegian adolescents aged 15-26 years. There is however much willingness to get vaccinated which may indicate that people trust Norwegian Health Authorities and believe they offer safe vaccination programs. As information about HPV and HPV-vaccination is limited and the vaccine uptake is suboptimal, we recommend improving the methods to convey information, to increase access to vaccination through the use of GPs and to lower cost barriers of the HPV-vaccine for those who want to receive the vaccine outside the current vaccination program.

# 8 References


Aalto, A.-M. (1999). *Diabetes cognitions and social support in the management of diabetes: A Cross-sectional study on social psychological determinants of health-related quality of life and self-care among adults with type 1 diabetes*: Stakes.

Andreassen, T. (2009). *En gammel sykdom, en ny vaksine***:** *Kartlegging av helsesøstrenes holdninger og kompetansebehov i forkant av HPV-vaksine innføringen.* Publishing: University of Oslo

Aftenposten.(2012). *Få bivirkninger av HPV-vaksine*. Read 10.10.2013 from http://web.retriever-info.com/services/archive/displayDocument?documentId=02000220121015890082&serviceId=2

Aftenposten. (2013). Én av fire stoler lite på vaksine- anbefaling. Read 10.11.2013 from http://web.retriever-info.com/services/archive/displayDocument?documentId=02000220130127106374 4&serviceId=2

Arbyn, M., Kyrgiou, M., Simoens, C., Raifu, A., Koliopoulos, G., Martin-Hirsch, P., . . . Paraskevaidis, E. (2008). Perinatal mortality and other severe adverse pregnancy outcomes associated with treatment of cervical intraepithelial neoplasia: meta-analysis. *BMJ: British Medical Journal, 337*.

Atkinson, G., & Nevill, A. M. (1998). Statistical methods for assessing measurement error (reliability) in variables relevant to sports medicine. *Sports medicine, 26*(4), 217-238.

Augoustinos, M., Walker, I., & Donaghue, N. (2006). *Social cognition: An integrated introduction*: Sage.

Bednarczyk, R. A., Davis, R., Ault, K., Orenstein, W., & Omer, S. B. (2012). Sexual activity–related outcomes after human papillomavirus vaccination of 11-to 12-year-olds. *Pediatrics, 130*(5), 798-805.

Benning, B. R., & Lund, M. R. (2007). Patient knowledge about human papillomavirus and relationship to history of abnormal Papanicolaou test results. *Journal of lower genital tract disease, 11*(1), 29-34.

Bergensavisen. (2013). *Vil gi alle HPV-vaksine.* Published 10.06.2013. Read from http://web.retriever-info.com/services/archive/displayDocument?documentId=05512420130610628C048C0D7F138BA8F065864114BACA&serviceId=2

Blodt, S., Holmberg, C., Muller-Nordhorn, J., & Rieckmann, N. (2012). Human Papillomavirus awareness, knowledge and vaccine acceptance: a survey among 18-25 year old male and female vocational school students in Berlin, Germany. *Eur J Public Health, 22*(6), 808-813. doi: 10.1093/eurpub/ckr188

Bowyer, H. L., Marlow, L. A., Hibbitts, S., Pollock, K. G., & Waller, J. (2013). Knowledge and awareness of HPV and the HPV vaccine among young women in the first routinely vaccinated cohort in England. *Vaccine, 31*(7), 1051-1056.

Brabin, L., Roberts, S. A., Farzaneh, F., & Kitchener, H. C. (2006). Future acceptance of adolescent human papillomavirus vaccination: A survey of parental attitudes. *Vaccine, 24*(16), 3087-3094. doi: http://dx.doi.org/10.1016/j.vaccine.2006.01.048

Burger EA, Sy S, Nygård M, Kristiansen IS, Kim JJ (2014) Prevention of HPV-Related Cancers in Norway: Cost-Effectiveness of Expanding the HPV

Vaccination Program to Include Pre-Adolescent Boys. PLoS ONE 9(3): e89974. doi:10.1371/journal.pone.0089974
Casciotti, D. M. (2011). *Controversy and cancer prevention: Media messages about the HPV vaccine*. THE JOHNS HOPKINS UNIVERSITY.
Darden, P. M., Thompson, D. M., Roberts, J. R., Hale, J. J., Pope, C., Naifeh, M., & Jacobson, R. M. (2013). Reasons for not vaccinating adolescents: National Immunization Survey of Teens, 2008–2010. *Pediatrics, 131*(4), 645-651.
Eriksson-Backa, K. (2003). In sickness and in health: how information and knowledge are related to health behaviour.
The Future 2 study group. Quadrivalent Vaccine against Human Papillomavirus to Prevent High-Grade Cervical Lesions. *The New England journal of Medicine*. N Engl J Med 2007; 356:1915-1927. DOI: 10.1056/NEJMoa061741
Fiske, S., & Taylor, S. (1984). Social cognition: From brains to culture. Sage
Fontenot, H. B., & Morelock, N. (2012). HPV in Men is a Women's Health Issue. *Nursing for Women's Health, 16*(1), 57-65. doi: 10.1111/j.1751-486X.2012.01701.x
Ford, C. A., English, A., Davenport, A. F., & Stinnett, A. J. (2009). Increasing adolescent vaccination: barriers and strategies in the context of policy, legal, and financial issues. *J Adolesc Health, 44*(6), 568-574. doi: 10.1016/j.jadohealth.2008.11.015
Fædrelandsvennen. (2012). *HPV-vaksinen trygg ifølge flere rapporter.* Published 05.10.2012. Read from http://web.retriever-info.com/services/archive/displayDocument?documentId=05503420121015890229&serviceId=2
Glanz, K., Rimer, B. K., & Viswanath, K. (2008). *Health behavior and health education: theory, research, and practice*: John Wiley & Sons.
Gottvall, M., Larsson, M., Hoglund, A. T., & Tyden, T. (2009). High HPV vaccine acceptance despite low awareness among Swedish upper secondary school students. *The European Journal of Contraception and Reproductive Health Care, 14*(6), 399-405.
Griffioen, A. M., Glynn, S., Mullins, T. K., Zimet, G. D., Rosenthal, S. L., Fortenberry, J. D., & Kahn, J. A. (2012). Perspectives on decision making about human papillomavirus vaccination among 11- to 12-year-old girls and their mothers. *Clin Pediatr (Phila), 51*(6), 560-568. doi: 10.1177/0009922812443732
Hardanger folkeblad. (2013). Si ja til vkasinen mot kreft!. Published 04.02.2013. Read from http://web.retriever-info.com/services/archive/displayDocument?documentId=05517520130204C79EF49208A9B6B9DA7741227E6DCB50&serviceId=2
Haug, C. (2008). Human Papillomavirus Vaccination — Reasons for Caution. N Engl J Med 2008; 359:861-862. DOI: 10.1056/NEJMe0804638
Henderson, L., Clements, A., Damery, S., Wilkinson, C., Austoker, J., & Wilson, S. (2011). 'A false sense of security'? Understanding the role of the HPV vaccine on future cervical screening behaviour: a qualitative study of UK parents and girls of vaccination age. *Journal of Medical Screening, 18*(1), 41-45. doi: 10.1258/jms.2011.010148
Herzog, T. J., Huh, W. K., Downs, L. S., Smith, J. S., & Monk, B. J. (2008). Initial lessons learned in HPV vaccination. *Gynecol Oncol, 109*(2 Suppl), S4-11. doi: 10.1016/j.ygyno.2008.01.018
Hjørland, B. (2000). Documents, memory institutions and information science. *Journal of Documentation, 56*(1), 27-41.

Jayanti, R., & Burns, A. (1998). The antecedents of preventive health care behavior: An empirical study. *Journal of the Academy of Marketing Science, 26*(1), 6-15. doi: 10.1177/0092070398261002

Kahn, J. A., Rosenthal, S. L., Jin, Y., Huang, B., Namakydoust, A., & Zimet, G. D. (2008). Rates of human papillomavirus vaccination, attitudes about vaccination, and human papillomavirus prevalence in young women. *Obstetrics & Gynecology, 111*(5), 1103-1110.

Katz, M. L., Kam, J. A., Krieger, J. L., & Roberto, A. J. (2012). Predicting human papillomavirus vaccine intentions of college-aged males: an examination of parents' and son's perceptions. *J Am Coll Health, 60*(6), 449-459. doi: 10.1080/07448481.2012.673523

Liddon, N., Hood, J., Wynn, B. A., & Markowitz, L. E. (2010). Acceptability of human papillomavirus vaccine for males: a review of the literature. *Journal of Adolescent Health, 46*(2), 113-123. doi: 10.1016/j.jadohealth.2009.11.199

Litwin, M. S. (1995). *How to measure survey reliability and validity* (Vol. 7): Sage.

McRee, A.-L., Reiter, P. L., Chantala, K., & Brewer, N. T. (2010). Does framing human papillomavirus vaccine as preventing cancer in men increase vaccine acceptability? *Cancer Epidemiology Biomarkers & Prevention, 19*(8), 1937-1944.

Mishra, A., & Graham, J. E. (2012). Risk, choice and the 'girl vaccine': Unpacking human papillomavirus (HPV) immunisation. *Health, Risk & Society, 14*(1), 57-69. doi: 10.1080/13698575.2011.641524

Mitchell, R. C., & Carson, R. T. (1989). *Using surveys to value public goods: the contingent valuation method*: Resources for the Future.

Mortensen, G. L. (2010). Drivers and barriers to acceptance of human-papillomavirus vaccination among young women: a qualitative and quantitative study. *BMC Public Health, 10*(1), 68.

Norwegian Instiute of Public Health (2010) Human papillomavirus(HPV),cervical cancer and the HPV-vaccine- Booklet, 2.edition (2010):1-11. Read from http://www.fhi.no/eway/default.aspx?pid=239&trg=Content_6510&Main_6157=6263:0:25,7059&MainContent_6263=6510:0:25,7066&Content_6510=6259:77653:25,7066:0:6250:2:::0:0

Norwegian Institute of Public health (2013). Annual Report for the HPV vaccine in the childhood immunization program in 2012. Published april.2013. Oslo: folkehelseinstituttet.

Norwegian Knowledge Centre for the Health Services. (2014). Cost-effectiveness of a HPV-vaccination catch-up program for females aged 26 years or younger in a Norwegian setting. Report from kunnskapsenteret No 5-2014. Report: ISBN 978-82-8121-851-2 ISSN 1890-1298

National Research, C., Institute of Medicine Committee on the Prevention of Mental, D., Substance Abuse Among Children, Y., Young Adults: Research, A., & Promising, I. (2009). The National Academies Collection: Reports funded by National Institutes of Health. In M. E. O'Connell, T. Boat & K. E. Warner (Eds.), *Preventing Mental, Emotional, and Behavioral Disorders Among Young People: Progress and Possibilities*. Washington (DC): National Academies Press (US) National Academy of Sciences.

Ogilvie, G. S., Remple, V. P., Marra, F., McNeil, S. A., Naus, M., Pielak, K. L., . . . Patrick, D. M. (2007). Parental intention to have daughters receive the human papillomavirus vaccine. *Canadian Medical Association Journal, 177*(12), 1506-1512.

OECD (2011, 21.march), *Health at a Glance 2011: OECD Indicators*, Chapter 5.8: Screening, survival and mortality for cervical cancer. OECD Publishing. Read from *http://dx.doi.org/10.1787/health_glance-2011-en*

Oxford Dictionaries. (2013). "knowledge". Oxford University Press, n.d. Web. 17 September 2013. <http://oxforddictionaries.com/definition/english/knowledge>.

Okoronkwo, C., Sieswerda, L. E., Cooper, R., Binette, D., & Todd, M. (2012). Parental consent to HPV vaccination for their daughters: The effects of knowledge and attitudes. *Canadian Journal of Human Sexuality, 21*(3/4), 117-126.

Oren, A., & Skjeldestad, F. (2006). Lite kunnskap om humant papillomvirus blant unge norske kvinner. *TIDSSKRIFT-NORSKE LAEGEFORENING, 126*(16), 2101.

Petersen, L. K., Nielsen, J., Vaesel, H., Bronsgaard, P. H., Kolby, P., & Madsen, K. G. (2009). [Knowledge of human papilloma virus-associated disease among women in general practice]. *Ugeskr Laeger, 171*(14), 1173-1177.

Photocure. (2013). HPV and precancerous lesions of the cervix with Photocure Technology™. Read 10.12.2013 from http://www.photocure.com/

Rakowski, W., Assaf, A. R., Lefebvre, R. C., Lasater, T. M., Niknian, M., & Carleton, R. A. (1990). Information-seeking about health in a community sample of adults: correlates and associations with other health-related practices. *Health Education & Behavior, 17*(4), 379-393.

Rimal, R. N. (2000). Closing the knowledge-behavior gap in health promotion: The mediating role of self-efficacy. *Health Communication, 12*(3), 219-237.

Rutter, D. R., & Quine, L. (2002). *Changing health behaviour* (Vol. 17): Open University Press Buckingham.

Samkange-Zeeb, F., Spallek, L., Klug, S., & Zeeb, H. (2012). HPV Infection Awareness and Self-Reported HPV Vaccination Coverage in Female Adolescent Students in Two German Cities. *Journal of Community Health, 37*(6), 1151-1156. doi: 10.1007/s10900-012-9589-1

Sudman, S., & Bradburn, N. M. (1982). Asking questions: a practical guide to questionnaire design.

Cancer Registry of Norway (2011). Increased acceptability of the screening program for cervical cancer. Read 10.03.2014 from http://kreftregisteret.no/no/Generelt/Nyheter/Okt-oppslutning-om-Masseundersokelsen-mot-livmorhalskreft-/?id=3105

The Cancer Registry of Norway. (2013). Livmorhalskreft, behandling og oppfølging. Last updated 10.01.2013. Read from http://www.kreftregisteret.no/no/Forebyggende/Masseundersokelsen-mot-livmorhalskreft/Kvinner/Livmorhalskreft/

Tengström, E. (1987). Humanistisk kunskap i framtidens informationsmiljö. *I: Gunnar Bergendal (red.), Information, kunskap, ansvar, Lund: Studentlitteratur*.

Thomasli, H. (2011). Hvilke faktorer avgjør om foreldre lar sine døtre vaksineres mot humant papillomavirus.

Tuominen, K., & Savolainen, R. (1997). *A social constructionist approach to the study of information use as discursive action.* Paper presented at the Information Seeking in Context: Proceedings of the International Conference on Research in Information Needs, Seeking and Use in Different Contexts.

Van Keulen, H., Otten, W., Ruiter, R., van Steenbergen, J., Fekkes, M., & Paulussen, T. (2012). [Reasons for having oneself vaccinated against HPV: implications for the future provision of information]. *Nederlands tijdschrift voor geneeskunde, 157*(17), A5523-A5523.

WHO. (2008). Vaccination greatly reduces disease, disability, death and inequity worldwide. *Bulletin of the World Health Organization(WHO), 86*(2).
WHO. (2014). Health promotion. Read from 13.04.2014 http://www.who.int/topics/health_promotion/en/

# 9 Appendix

## 9.1 Translation of the Female Questionnaire

| Q1. Do you know which sexually transmittable diseases condoms do not protect well enough against, in case which?(First mentioned) |
|---|
| Cervical cancer |
| HPV |
| Chlamydia |
| Other |
| No |

| Q6. Did you know that there exists a vaccine against HPV? |
|---|
| Yes |
| No |
| Don't know |

| Q2. Do you know which sexually transmittable diseases condoms do not protect well enough against, in case which?(Secondly mentioned)** |
|---|
| Cervical cancer |
| HPV |
| Chlamydia |
| Other |
| No |

| Q7. Are you been vaccinated against HPV? |
|---|
| Yes |
| No |
| Don't know |

| Q3. Have you heard of HPV (the human papilloma virus)? |
|---|
| Yes |
| No |
| Don't know |

| Q8. How much would you be willing to pay for a vaccine that protects against cancer and genital warts, choose a price between 500 - and 10.000 NOK?* |
|---|
| *The ones that did not know or did not want to answer=non-response |
| • Note the amount:…… |

| Q4. HPV is a sexually transferable virus that can lead to abnormalities in the cervix. The virus can cause several types of diseases. What diseases do you think that it can lead to?(unaided) |
|---|
| Cervical cancer |
| Cancer |
| Sexually transmitted diseases |
| Other |
| Don't know |

| Q9. If you received the vaccine free of charge, would you get yourself vaccinated? |
|---|
| Yes |
| No |
| Don't know |

| Q5. How do you think you can protect yourself against an HPV-infection?(unaided) |
|---|
| Condom |
| Contraceptives |
| Vaccination |
| Other |
| |

| Q10. Where would you have gone to get vaccinated?(unaided) |
|---|
| 1. Public Health Nurse |
| General practitioner |
| Other, note:…… |
| Don't know |
| |

| Q11. Who would you like to provide you with information on HPV and how to protect yourself? | 15. What is your county of residence? |
|---|---|
| Public health nurse | 1. Østfold |
| General practitioner | 2. Akershus |
| Parents | 3. Oslo |
| Internet | 4. Hedmark |
| Other | 5. Oppland |
| Don't know | 6. Buskerud |
| | 7. Vestfold |
| | 8. Telemark |
| | 9. Aust-Agder |
| | 10. Vest-Agder |
| | 11. Rogaland |
| | 12. Hordaland |
| | 13. Sogn og Fjordane |
| | 14. Møre og Romsdal |
| | 15. Sør-Trøndelag |
| | 16. Nord-Trøndelag |
| | 17. Nordland |
| | 18. Troms |
| | 19. Finnmark |

| Q12. The HPV-virus causes disease among boys and girls. Girls in the 7th grade are offered the vaccine free of charge-*should* boys get the same offer? |
|---|
| Yes |
| No |
| Don't know |

| Q13. What is your age? |
|---|
| Note:…… |

| 14. What is your highest educational attainment? |
|---|
| Elementary school, lower level(8 years) |
| Elementary school, secondary level(9-10 years) |
| High school(11-13 years) |
| University level(12years+ further studies) |
| In education |

**Additional items registered:**

1. Start time total
2. Interviewers number
3. Date
4. SMS-identification
5. Week number
6. Municipality
7. Landline/cellphone
8. End time
9. Total time use

**Note that question 1 and 2 is the same question; in the original questionnaire these are named 1a and 1b. 1a is the registered answers that were mentioned first and 1b is the registered answers that were mentioned later on.

## 9.2 Translation of the Male Questionnaire

| A. Sex: | F. What is your zip code? |
|---|---|
| Male | |
| Female | Note zip code:……. |
| B. Age: | |
| Note age:……. | |

| C. County: | G. Where do you live? (Centrality) |
|---|---|
| 1. Østfold | Big city |
| 2. Akershus | Smaller city |
| 3. Oslo | Urban settlement |
| 4. Hedmark | In the country |
| 5. Oppland | |
| 6. Buskerud | |
| 7. Vestfold | |
| 8. Telemark | |
| 9. Aust-Agder | |
| 10. Vest-Agder | |
| 11. Rogaland | |
| 12. Hordaland | |
| 13. Ubenyttet | |
| 14. Sogn og Fjordane | |
| 15. Møre og Romsdal | |
| 16. Sør-Trøndelag | |
| 17. Nord-Trøndelag | |
| 18. Nordland | |
| 19. Troms | |
| 20. Finnmark | |

| H. How many people are living in the household? |
|---|
| 1 person |
| 2 people |
| 3 people |
| 4 people |
| 5 people |
| 6 people |
| 7 people |
| 8 people |
| 9 people or more |

| D. What is your highest educational attainment? | I. What is your marital status? |
|---|---|
| Elementary school | Married/cohabitants/couple |
| Junior High school | Living with friends |
| High school | Single |
| University level | Living with parents |
| In education | |

| E. What is the household's total gross income (in NOK)? | J. How many children under the age of 18 are there in the household? |
|---|---|
| Up to 100.000 | |
| 100.-199.000 | Number of children: …….. |
| 200.-299.000 | |
| 300.-399.000 | |
| 400.-499.000 | |
| 500.-599.000 | |
| 600.-799.000 | |
| 800.-999.000 | |
| 1 mill. + | |
| Do not want to disclose | |
| Don't know | |

| Q1. Do you know which sexually transmittable diseases condoms do not protect well enough against, in case which?(Unaided) | Q6.How do you think you can protect yourself against the HPV-virus? |
|---|---|
| Write the diseases you can think of: …… | Type answer here: …… |

| Q2.Do you know which sexually transmittable diseases condoms do not protect well enough against, in case which?<br>Select also the ones you that you registered in the previous question. | Q7. Did you know that there exists an HPV-vaccine? |
|---|---|
| Cervical cancer | Yes |
| HPV | No |
| Chlamydia | Don't know |
| Aids | |
| Herpes | |
| Genital warts | |
| None of these | |
| Don't know | |

| Q3. Have you heard of HPV (the Human papilloma virus)? | Q8. Are you vaccinated against HPV? |
|---|---|
| Yes | Yes |
| No | No |
| Don't know | Don't know |

| Q4. HPV is a sexually transferable virus that can cause cell changes. The virus can cause several types of diseases. What are some of these diseases? | Q9. How much would you be willing to pay for a vaccine that protects against cancer and genital warts, choose a price between 500 - and 10.000, -?*<br>*If do not know, go to next question |
|---|---|
| Type answers here:…… | Note the amount:…… |

| Q5. As mentioned HPV is a sexually transferable<br>virus that can lead to several types of diseases. Which of the following diseases do you think it can cause?<br>*Select also the ones that you have registered in the previous question. | Q10. If you received the vaccine free of charge, would you get yourself vaccinated? |
|---|---|
| Cervical cancer | Yes |
| Cancer in the penis | No |
| Genital warts | Don't know |
| Cancer in the mouth and throat | |
| Rectal cancer | |
| Herpes | |
| AIDS | |
| Cancer in the vagina | |
| Lymph cancer | |
| None of these | |
| Don't know | |

| Q11. Where would you have gone to get vaccinated?(Unaided) |
|---|
| Public health nurse |
| General practitioner |
| Other places, note…….. |
| Don't know |

| Q12. Who would you like to provide you with information on HPV and how to protect yourself? |
|---|
| Public health nurse |
| General practitioner |
| Parents |
| Internet |
| Other |
| Don't know |

| Q13. The HPV-virus causes disease among boys and girls. Girls in the 7th grade are offered the vaccine free of charge-*should* boys get the same offer? |
|---|
| Yes |
| No |
| Don't know |

**The additional items registered:**

- **Start time**
- **Week number**
- **Weekday**
- **Web-id**
- **Project-id**
- **List basis- Ordinary base draw:**
  **Costumer list/Enlisted by phone/Enlisted from E-base**
- **End time**
- **End date**
- **Comment field**

## 9.3 **The Questionnaires in Norwegian**

| **Spørreskjema: Jenter (108178)** |
|---|

| **1A. Vet du hvilke seksuelt overførbare sykdommer kondom ikke beskytter godt nok mot, i tilfelle hvilke? (Først nevnt)** |
|---|
| **Livmorhalskreft** |
| **HPV** |
| **Klamydia** |
| **Andre** |
| **Nei** |

| **1B. Vet du hvilke seksuelt overførbare sykdommer kondom ikke beskytter godt nok mot, i tilfelle hvilke? (Senere nevnt)**** |
|---|
| **Livmorhalskreft** |
| **HPV** |
| **Klamydia** |
| **Other** |
| **Nei** |

| **2. Har du hørt om HPV (humant papilloma virus)?** |
|---|
| **Ja** |
| **Nei** |
| **Vet ikke** |

| **3. HPV er et seksuelt overførbart virus som kan føre til celleforandringer i livmorhalsen. Viruset kan føre til flere typer sykdommer. Hvilke sykdommer tror du det kan føre til? (Uhjulpet)** |
|---|
| **Livmorhalskreft** |
| **Kreft** |
| **Kjønnssykdom** |
| **Andre** |
| **Vet ikke** |

| **4. Hvordan tror du man kan beskytte seg mot HPV-infeksjon?** |
|---|
| **Kondom** |
| **Prevensjonsmidler** |
| **Vaksine** |
| **Andre** |
| **Vet ikke** |
| |

| **5. Visste du at det finnes en vaksine mot HPV-infeksjon?** |
|---|
| **Ja** |
| **Nei** |
| **Vet ikke** |
| |

| **6. Er du vaksinert mot HPV-virus?** |
|---|
| **Ja** |
| **Nei** |
| **Vet ikke** |
| |

| **7. Hvor mye er du villig til å betale for en vaksine som beskytter deg mot kreft og kjønnsvorter, velg en pris mellom kr 500 og kr 10.000?*** |
|---|
| *Vet ikke og ikke interessert I å betale=ubesvart |
| • **Noter beløp:……** |
| |

| **8. Dersom du fikk vaksinen gratis, ville du da ha vaksinert deg?** |
|---|
| **Ja** |
| **Nei** |
| **Vet ikke** |
| |

| **9. Hvor ville du gått for å vaksinere deg? (uhjulpet)** |
|---|
| **Helsesøster** |
| **Fastlegen** |
| **Annet sted, noter:……..** |
| **Vet ikke** |
| |

| 10. Hvem ønsker du skal informere om HPV og hvordan man best beskytter seg?(uhjulpet) |
|---|
| Helsesøster |
| Fastlegen |
| Foresatte |
| Internett |
| Andre |
| Vet ikke |

| 11. HPV-viruset forårsaker sykdom hos både gutter og jenter. I dag får jenter i 7. klasse vaksinen gratis – burde gutter få det samme tilbudet? |
|---|
| Ja |
| Nei |
| Vet ikke |

| 12. Hva er din alder? |
|---|
| Noter:…… |

| 15. Hvilket fylke bor du i? |
|---|
| 1. Østfold |
| 2. Akershus |
| 3. Oslo |
| 4. Hedmark |
| 5. Oppland |
| 6. Buskerud |
| 7. Vestfold |
| 8. Telemark |
| 9. Aust-Agder |
| 10. Vest-Agder |
| 11. Rogaland |
| 12. Hordaland |
| 13. Sogn og Fjordane |
| 14. Møre og Romsdal |
| 15. Sør-Trøndelag |
| 16. Nord-Trøndelag |
| 17. Nordland |
| 18. Troms |
| 19. Finnmark |

| 13. Hva er din høyeste fullførte utdannelse? |
|---|
| Folkeskolenivå (Inntil 8 års skolegang) |
| Ungdomskole/Realskolenivå (9-10 års skoelgang) |
| Videregående/gymnasnivå (11-13 års skolegang) |
| Universitetsnivå (12 år+studier) |
| Er under utdanning |

**Øvrig registrert informasjon:**

1. **Starttid total**
2. **Intervjuernr.**
3. **Dato**
4. **SMS-id**
5. **Uke nr.**
6. **Kommunenr.**
7. **Fasttelefon/mobiletelefon**
8. **Sluttid totalt**
9. **Tidsbruk totalt**

**Spørreskjema: Gutter (108257)**

| A. Kjønn: |
|---|
| Mann |
| Kvinne |
| B. Alder: |
| Noter alder:…… |

| F. Hva er ditt postnummer? |
|---|
| • |
| Noter postnr.:…… |
| |
| |

| C. Fylke: |
|---|
| Østfold |
| Akershus |
| Oslo |
| Hedmark |
| Oppland |
| Buskerud |
| Vestfold |
| Telemark |
| Aust-Agder |
| Vest-Agder |
| Rogaland |
| Hordaland |
| Ubenyttet |
| Sogn og Fjordane |
| Møre og Romsdal |
| Sør-Trøndelag |
| Nord-Trøndelag |
| Nordland |
| Troms |
| Finnmark |

| G. Hvor bor du? (Sentralitet) |
|---|
| Stor by |
| Mindre by |
| Tettsted |
| På landet |

| H. Hvor mange personer bor det i husstanden? |
|---|
| 1 person |
| 2 personer |
| 3 personer |
| 4 personer |
| 5 personer |
| 6 personer |
| 7 personer |
| 8 personer |
| 9 personer eller flere |

| D. Hva er din høyeste fullførte utdannelse? |
|---|
| Folkeskolenivå |
| Ungdomskole/realskolenivå |
| Videregående/gymnasnivå |
| Universitetsnivå |
| Under utdanning |

| I. Hva er din sivilstand? |
|---|
| 1. Gift/samboende/par |
| 2. Samboende med venner |
| 3. Enslig |
| 4. Bor hos foreldre |
| |

| E. Hva er husstandens samlede bruttoinntekt? |
|---|
| Inntil kr. 100.000 |
| Kr. 100.-199.000 |
| Kr. 200.-299.000 |
| Kr. 300.-399.000 |
| Kr. 400.-499.000 |
| Kr. 500.-599.000 |
| Kr. 600.-799.000 |
| Kr. 800.-999.000 |
| Kr 1 mill. + |
| Vil ikke oppgi |
| Vet ikke |

| J. Hvor mange hjemmeboende barn under 18 år er det i husstanden? |
|---|
| |
| Antall barn: …..... |
| |

| 1.Vet du hvilke seksuelt overførbare sykdommer kondom ikke beskytter godt nok mot? | 6. Hvordan tror du man kan beskytte seg mot en HPV-infeksjon? |
|---|---|
| Skriv inn de du kommer på: …….. | Skriv inn: …….. |

| 2. Vet du hvilke seksuelt overførbare sykdommer kondom ikke beskytter godt nok mot?<br>Merk også av på den/de du ikke skrev inn i forrige spørsmål | 7. Visste du at det finnes en vaksine mot HPV-virus? |
|---|---|
| Livmorhalskreft | Ja |
| HPV | Nei |
| Klamydia | Vet ikke |
| Aids | |
| Herpes | |
| Kjønnsvorter | |
| Ingen av disse | |
| Vet ikke | |

| 3. Har du hørt om HPV (Humant papilloma virus)? | Q8. Er du vaksinert mot HPV virus? |
|---|---|
| Ja | Ja |
| Nei | Nei |
| Vet ikke | Vet ikke |

| 4. HPV er et seksuelt overførbart virus som kan føre til celleforandringer. Viruset kan føre til flere typer sykdommer. Kan du nevne noen av disse sykdommene? | 9. Hvor mye er du villig til å betale for en vaksine som beskytter deg mot kreft og kjønnsvorter, velg en pris mellom kr 500 og kr 10.000?*<br>*Hvis vet ikke, gå til neste spørsmål |
|---|---|
| Skriv inn:…….. | Noter beløp:…….. |

| 5. Som nevnt er HPV er et seksuelt overførbart virus som kan føre til flere typer sykdommer. Hvilke av følgende sykdommer tror du det kan føre til?<br>Merk av i listen nedenfor (merk også av for den/de du skrev inn i forrige spørsmål) | 10. Hvis du fikk vaksinen gratis, ville du da ha vaksinert deg? |
|---|---|
| Livmorhalskreft | Ja |
| Kreft i penis | Nei |
| Kjønnsvorter | Vet ikke |
| Kreft I munnhule og svelg | |
| Endetarms kreft | |
| Herpes | |
| AIDS | |
| Kreft i skjede | |
| Lymfekreft | |
| Ingen av disse | |
| Vet ikke | |

| 11. Hvor ville du gått for å vaksinere deg? |
|---|
| Helsesøster |
| Fastlegen |
| Annet sted, noter…… |
| Vet ikke |

| 12. Hvem ønsker du skal informere deg om HPV og hvordan man best beskytter seg? |
|---|
| Helsesøster |
| Fastlegen |
| Foresatte |
| Internett |
| Andre |
| Vet ikke |

| 13. HPV-viruset forårsaker sykdom hos både gutter og jenter. I dag får jenter i 7. klasse vaksinen gratis – burde gutter få det samme tilbudet? |
|---|
| Ja |
| Nei |
| Vet ikke |

**Øvrig registrert informasjon:**

- **Starttid**
- **Ukenr.**
- **Ukedag**
- **Web-id**
- **Prosjekt-id**
- **Liste basis- Ordinert basetrekk:**
  **Kundeliste/Vervet på Cati(telefon) /Vervet fra E-base**
- **Slutttid**
- **Sluttdato**
- **Kommentarfelt**

## 9.4 List of Tables from Statistics Norway (SSB)

The tables listed below were used to find information about the population that our sample were drawn from and used in table 1 and table 13 – in order to assess the generalizability of our study.

| | | |
|---|---|---|
| **Table 09745:** | **Births by sex** | **(1986-2013)** |
| **Table 08921:** | **Persons 16 years and older, by sex, age and level of education. Numbers and per cent** | **(1980 - 2012)** |
| **Table 07459**: | **Population, by sex and one-year age groups.** | **(1986-2014)** |